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FLORA

OF

TROPICAL AFRICA.

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BY

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VOL. I.

RANUNCULACEÆ TO CONNARACEÆ.

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PREFACE.

THE more original portion of the 'Flora of Tropical Africa' is based upon the very extensive collections that have accumulated at Kew during the last ten years, sent home by the Botanists and Collectors attached to various scientific and exploratory journeys in Tropical Africa. The principal of these collections are enumerated below.

From our very imperfect knowledge of the vegetation of many parts of the Continent, even of those which have been long more or less in European occupation, and from our complete ignorance of that of the immensely larger area not yet opened up, the present work must not be regarded as presenting anything like a complete account of Tropical African Botany. It serves rather as a vehicle for the publication of the important botanical results of much recent expenditure of life, toil, and money, which would otherwise have been lost to science or anticipated by other nations, and (embracing references to all hitherto published African species) as a repertory which it is hoped may be useful to Botanists, no less than to future explorers and residents in Africa interested in the natural productions and economic products of the country.

The number of species here described being doubtless much smaller than the vast area of intertropical Africa must contain, it has been necessary to go into greater detail, especially in the descriptions of new species, than would have been the case had the Continent been more thoroughly explored, and its botanical novelties more nearly exhausted. In a well-explored area the species may be determined by a few selected diagnostic characters; but when few are known out of many presumed

to exist, it is impossible to say which may be the diagnostic characters of a species and which common to others of the genus.

The 'Flora of Tropical Africa,' forming one of the series of Floras undertaken, at the instance of the late Sir William J. Hooker, under the authority of the Home or of Colonial Governments, it is necessarily uniform in general plan with those which have been already issued.

The principal features of this plan, as settled by Sir W. J. Hooker, and described in his report*, are these:—

1st. The descriptions are drawn up in the English language. A glossary contains the technical terms used in the descriptions, together with Mr. Bentham's 'Introduction to Botany, drawn up with special reference to Local Floras,' being prefixed to the work.

2nd. The general sequence of Natural Orders adopted is that of the 'Prodromus' of De Candolle, being that which experience has shown to be practically the most convenient. In accordance with this sequence, British Botanists are accustomed to arrange their Herbaria and works of descriptive Botany. In the more detailed arrangement of the genera, the 'Genera Plantarum' of Messrs. Bentham and Hooker has been followed, and a reference to that work is given with each genus.

With regard to the synonymy of the species here described, while the authors have endeavoured to quote all names which have been applied to tropical African plants, they have not, in the case of widely diffused species, regarded it as either necessary or desirable to include their whole synonymy, the reliable citation of which would have involved very much more time, labour, and space than the end to be attained would warrant, besides that it would be out of place in a special work of this kind. Any new identifications of African with extra-African species are of course recorded.

Those who are unaccustomed to the use of works of descriptive Botany in the field, it may be well to caution in respect of the dimensions of the various organs given throughout the work in English feet, inches, and lines ($\frac{1}{12}$ inch). The extremes quoted are simply intended to in-

* See 'Natural History Review,' 1861, p. 255.

clude the usual or average range of size in the specimens examined by the authors, and which in nature are often departed from according to circumstances favourable or unfavourable to luxuriance, in which the plant may be placed. It may be observed, however, that relative proportions often hold good, while absolute size may be widely different. Nor must undue importance be attached to the more prominent and briefly expressed characters made use of in the synoptical tables which are given under each genus of two or more species. These are intended to serve rather as guides in the determination of the species than as absolute or final indications, and must always be checked by a comparison of the specimen with the more detailed description.

In citing the several localities for each species, it has appeared expedient to arrange them under six principal geographical regions into which the enormous area embraced by this Flora has been divided.* These are:—

1. Upper Guinea, including under this term the Western Coast region from the river Senegal on the north to Cape Lopez, immediately south of the equator; the interior drained by rivers intermediate between these limits; and the small islands of the Gulf of Guinea, Fernando Po, Prince's Island, St. Thomas and Annabon.

2. North Central. The Sahara eastward to the countries watered by the Nile and its tributaries, including also Bornu and Haussa.

3. Nile Land. The area drained by the Nile, extending some three or four degrees south of the equator, so as to include the plants collected by Captains Speke and Grant, after leaving the watershed coastwards on their way from Zanzibar to the Victoria Nyanza.

4. Lower Guinea. Western tropical Africa, from Cape Lopez southward to the tropic of Capricorn, including Congo, Angola, Benguella, and Mossamedes.

5. South Central. This includes the upper Zambesi from the Victoria Falls, Lake Ngami, and a vast area as yet unexplored.

* To the citation of localities, the sign (!) is added whenever a specimen has been actually seen by the author. An asterisk (*) is prefixed to those species which are believed to have been introduced.

6. Mozambique District. Under this general term are included, not only Mozambique proper, but Zanzibar, Zambesi-land, and the coast region southward to the tropic.

The more important collections contained in the Kew Herbarium from Upper Guinea are the following:—

1. The plants collected by Dr. Theodore Vogel and his assistant Mr. Ansell, on the Niger Expedition, organized by the African Civilization Society, in 1841, and which formed the basis of the 'Flora Nigritiana' of Dr. Hooker and Mr. Bentham, published in 1849. Besides the numerous specimens collected on the banks of the Niger itself, this collection includes many from Sierra Leone, Fernando Po, Accra, and other points touched at by the expedition. These, of course, have been already published in the work referred to.

2. The very large collections made by Mr. Charles Barter, attached to the Niger Expedition under Dr. Baikie, in 1857, 1858, and 1859, together with some specimens, sent home by Dr. Baikie himself.

3. The yet more important collections, made by Mr. Gustav Mann, under the auspices of the Admiralty, in Fernando Po, St. Thomas and Prince's Islands, Old Calabar, Camaroons mountains, Corisco Bay, Rivers Muni and Gaboon, and the Sierra del Crystal.

4. Collections made, chiefly in the neighbourhood of Abbeokuta, by the late Dr. Irving.

5. A collection from Old Calabar and neighbourhood, made by the Rev. W. C. Thomson, and transmitted to Kew by Professor Balfour. Besides the above, the Kew Herbarium contains valuable sets from Senegambia, collected by Heudelot and Leprieur, communicated to Sir W. J. Hooker by M. B. Delessert, through his curator, M. Guillemin; and a few collected by M. Bidjem, communicated by Count Franqueville; and from Sierra Leone, collected by Don, Whitfield, Miss Turner, and others.

Reference has also been made to the specimens contained in the Herbarium of the British Museum, collected by Afzelius, Smeathmann, Dr. Daniell, and others, at Sierra Leone, and by Leprieur and Perrottet in Senegambia.

From NORTH CENTRAL our material is exceedingly scanty, being almost limited to specimens collected by Dr. Edward Vogel in crossing the Sahara, by way of Aghadem, and in Bornu and adjacent provinces. A few plants are cited from this region, on the authority of Robert Brown's 'Essay on the Plants of Oudney, Denham, and Clapperton': the specimens collected by these travellers are lost.

From NILE LAND, there are at Kew excellent sets of:—

1. Dr. Schimper's Abyssinian collections, distributed by the 'Unio Itineraria' of Würtemberg.

2. Dr. Kotschy's Kordofan and Nubian plants.

3. Abyssinian plants, collected by Dr. Roth in 1841–42, presented by the East India Company.

4. Abyssinian plants of Dillon, Petit, and others, communicated by Count Franqueville, from the Richardian Herbarium in his possession.

5. Upper Nile Plants, collected by Mr. Petherick and Dr. Murie, communicated to Sir W. J. Hooker by the former distinguished traveller.

6. Nubian plants, collected by Dr. Bromfield.

7. Captain Grant's valuable herbarium, with his original notes, formed in company with Captain Speke on their celebrated expedition to the Victoria Nyanza.

8. A set of Dr. Schweinfurth's Nubian and Gallabat plants.

9. Specimens of a few resin-affording trees, from the Somali country, communicated by Colonel Playfair.

We have also had the opportunity of examining the plants, collected by Mr. Salt in Abyssinia, which were determined by Mr. Brown, and enumerated in the Appendix to his travels, contained in the Herbarium of the British Museum.

For our material from LOWER GUINEA, we are almost wholly indebted to the courtesy of Dr. Friedrich Welwitsch, who, with rare liberality, has freely granted us the opportunity of inspecting his collections, which, in respect of judicious selection and admirable preservation, are without rival. His carefully accurate notes upon the fresh plants have

also been at our service. Without the access to Dr. Welwitsch's Herbarium, this region would have been comparatively a blank in the present work. There remain but few Natural Orders treated of in the first volume, of which we have not yet had the opportunity of inspecting his specimens, and, of these, we may be able to embody the novelties in an Appendix. To this distinguished naturalist I tender the warmest thanks on behalf of my collaborators and myself.

A set of plants, from the Congo, collected by Professor Christian Smith, and a few gathered on the banks of the same river by Mr. Consul Burton, are in the Kew Herbarium, also a small collection from Elephants' Bay, made by Dr. Curror.

South Central: from this region we possess a few plants, collected by Drs. Kirk and Meller on the Upper Zambesi,* and a small collection, made under adverse circumstances, by Messrs. Baines and Chapman towards the southern tropic and about Lake Ngami, in their adventurous journey from Waalvisch Bay to the Upper Zambesi.

From the Mozambique District Kew possesses—

The large collections from the Zambesi, its tributary the Shire, Lake Nyassa, and adjacent country, made by Dr. John Kirk, the accomplished naturalist and medical officer of the Livingstone Expedition, received in 1860–62. These collections are accompanied by valuable notes and drawings made upon the spot. From the same region we have also a number of specimens, gathered by Dr. J. Meller, attached to the Church of England Mission, associated with Dr. Livingstone's Second Expedition, and by Mr. Horace Waller.

2. Plants, from the Rovuma river, collected by Drs. Kirk and Meller.

3. A set of Dr. Peter's Zambesi and Mozambique plants, determined by Dr. Klotzsch, communicated by the Royal Herbarium at Berlin, from whence, also, we have been favoured with the loan of unique specimens belonging to the same Herbarium.

4. A few plants from Zanzibar, collected by M. Bojer, Captain Speke, and Dr. Kirk, at present H.M. Vice-Consul at Zanzibar.

* The bulk of the Upper Zambesi collections, made by Dr. Kirk, was unfortunately lost.

In working up this Flora, I have had the great advantage, in every doubtful case, of being permitted to consult Mr. Bentham and Dr. J. D. Hooker, whose large acquaintance with the flora of tropical Africa, especially of the western coast, already studied by them in the preparation of the 'Flora Nigritiana,' has enabled them to afford me very material assistance. To Dr. Hooker I am further obliged for the monograph of the genus *Impatiens*. I had hoped that a considerable portion of this Flora might have been worked up by him, but numerous official engagements and the publication of the 'Genera Plantarum,' in conjunction with Mr. Bentham, have altogether prevented his taking a larger and direct part in this work. The preparation, however, for the 'Genera Plantarum,' so greatly facilitates the elaboration of such works as the present, that, indirectly, both Messrs. Bentham and Hooker have largely contributed to the present volume. To my friend Dr. M. T. Masters, F.L.S., and to my colleagues in the Herbarium, Mr. J. G. Baker, F.L.S., and Mr. W. B. Hemsley, I am also much indebted, for so kindly undertaking the monographs of the various Orders to which their names are affixed.

D. O.

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OUTLINES OF BOTANY

TO ACCOMPANY THE COLONIAL FLORAS.

From Mr. Bentham's 'Flora Australiensis.'

CHAP. I. DEFINITIONS AND DESCRIPTIVE BOTANY.

1. The principal object of a **Flora** of a country is to afford the means of *determining* (*i. e.* ascertaining the name of) any plant growing in it, whether for the purpose of ulterior study or of intellectual exercise.

2. With this view, a Flora consists of descriptions of all the wild or native plants contained in the country in question, so drawn up and arranged that the student may identify with the corresponding description any individual specimen which he may gather.

3. These descriptions should be *clear*, *concise*, *accurate*, and *characteristic*, so as that each one should be readily adapted to the plant it relates to, and to no other one; they should be as nearly as possible arranged under *natural* (184) divisions, so as to facilitate the comparison of each plant with those nearest allied to it; and they should be accompanied by an *artificial key* or index, by means of which the student may be guided step by step in the observation of such peculiarities or *characters* in his plant, as may lead him, with the least delay, to the individual description belonging to it.

4. For descriptions to be clear and readily intelligible, they should be expressed as much as possible in ordinary well-established language. But, for the purpose of accuracy, it is necessary not only to give a more precise technical meaning to many terms used more or less vaguely in common conversation, but also to introduce purely technical names for such parts of plants or forms as are of little importance except to the botanist. In the present chapter it is proposed to define such *technical* or *technically limited* terms as are made use of in these Floras.

5. At the same time mathematical accuracy must not be expected. The forms and appearances assumed by plants and their parts are infinite. Names cannot be invented for all; those even that have been proposed are too numerous for ordinary memories. Many are derived from supposed resemblances to well-known forms or objects. These resemblances are differently appreciated by different persons, and the same term is not only differently applied by two different botanists, but it frequently happens that the same writer is led on different occasions to give somewhat different meanings to the same word. The botanist's endeavours should always be, on the one hand, to make as near an approach to precision as circumstances will allow; and, on the other hand, to avoid that prolixity of detail and overloading with technical terms which tends rather to confusion than clearness. In this he will be more or less successful. The aptness of a botanical description, like the beauty of a work of imagination, will always vary with the style and genius of the author.

§ 1. *The Plant in General.*

6. The **Plant**, in its botanical sense, includes every being which has *vegetable life*, from the loftiest tree which adorns our landscapes, to the humblest moss which grows on its stem, to the mould or fungus which attacks our provisions, or the green scum that floats on our ponds.

7. Every portion of a plant which has a distinct part or *function* to perform in the operations or phenomena of vegetable life is called an **Organ.**

8. What constitutes *vegetable life*, and what are the functions of each organ, belong to *Vegetable Physiology;* the microscopical structure of the tissues composing the organs, to *Vegetable Anatomy;* the composition of the substances of which they are formed, to *Vegetable Chemistry;* under *Descriptive and Systematic Botany* we have chiefly to consider the forms of organs, that is, their *Morphology*, in the proper sense of the term, and their general structure so far as it affects classification and specific resemblances and differences. The terms we shall now define belong chiefly to the latter branch of Botany, as being that which is essential for the investigation of the Flora of a country. We shall add, however, a short chapter on Vegetable Anatomy and Physiology, as a general knowledge of both imparts an additional interest to and facilitates the comparison of the characters and affinities of the plants examined.

9. In the more perfect plants, their organs are comprised in the general terms **Root, Stem, Leaves, Flowers,** and **Fruit.** Of these the three first, whose function is to assist in the growth of the plant, are *Organs of Vegetation;* the flower and fruit, whose office is the formation of the seed, are the *Organs of Reproduction.*

10. All these organs exist, in one shape or another, at some period of the life of most, if not all, *flowering plants*, technically called *phænogamous* or *phanerogamous plants:* which all bear some kind of flower and fruit in the botanical sense of the term. In the lower classes, the ferns, mosses, fungi, moulds or mildews, seaweeds, etc., called by botanists *cryptogamous plants*, the flowers, the fruit, and not unfrequently one or more of the organs of vegetation, are either wanting, or replaced by organs so different as to be hardly capable of bearing the same name.

11. The observations comprised in the following pages refer exclusively to the flowering or phænogamous plants. The study of the cryptogamous classes has now become so complicated as to form almost a separate science. They are therefore not included in these introductory observations, nor, with the exception of ferns and their allies, in the present Flora.

12. **Plants** are

Monocarpic, if they die after one flowering-season. These include *Annuals*, which flower in the same year in which they are raised from seed; and *Biennials*, which only flower in the year following that in which they are sown.

Caulocarpic, if, after flowering, the whole or part of the plant lives through the winter and produces fresh flowers another season. These include *Herbaceous perennials*, in which the greater part of the plant dies after flowering, leaving only a small perennial portion called the Stock or Caudex, close to or within the earth; *Undershrubs, suffruticose* or *suffrutescent* plants, in which the flowering branches, forming a considerable portion of the plant, die down after flowering, but leave a more or less prominent perennial and woody base; *Shrubs* (*frutescent* or *fruticose plants*), in which the perennial woody part forms the greater part of the plant, but branches near the base, and does not much exceed a man's height; and *Trees* (*arboreous* or *arborescent plants*) when the height is greater and forms a woody *trunk*, scarcely branching from the base. *Bushes* are low, much branched shrubs.

13. The terms *Monocarpic* and *Caulocarpic* are but little used, but the other distinctions enumerated above are universally attended to, although more useful to the gardener than to the botanist, who cannot always assign to them any precise character. Monocarpic plants, which require more than two or three years to produce their flowers, will often, under certain circumstances, become herbaceous perennials, and are generally confounded with them. Truly perennial herbs will often commence flowering the first year, and have then all the appearance of annuals. Many tall shrubs and trees lose annually their flowering branches like undershrubs. And the same

botanical species may be an annual or a perennial, a herbaceous perennial or an undershrub, an undershrub or a shrub, a shrub or a tree, according to climate, treatment, or variety.

14. Plants are usually *terrestrial*, that is, growing on earth, or *aquatic*, *i. e.* growing in water; but sometimes they may be found attached by their roots to other plants, in which case they are *epiphytes* when simply growing upon other plants without penetrating into their tissue, *parasites* when their roots penetrate into and derive more or less nutriment from the plant to which they are attached.

15. The simplest form of the perfect plant, the annual, consists of—

(1) The **Root,** or descending axis, which grows downwards from the stem, divides and spreads in the earth or water, and absorbs food for the plant through the extremities of its branches.

(2) The **Stem,** or ascending axis, which grows upwards from the root, branches and bears first one or more leaves in succession, then one or more flowers, and finally one or more fruits. It contains the tissues or other channels (217) by which the nutriment absorbed by the roots is conveyed in the form of *sap* (192) to the leaves or other points of the surface of the plant, to be *elaborated* or *digested* (218), and afterwards redistributed over different parts of the plant for its support and growth.

(3) The **Leaves,** usually flat, green, and horizontal, are variously arranged on the stem and its branches. They *elaborate* or *digest* (218) the nutriment brought to them through the stem, absorb carbonic acid gas from the air, exhaling the superfluous oxygen, and returning the assimilated sap to the stem.

(4) The **Flowers,** usually placed at or towards the extremities of the branches. They are destined to form the future seed. When perfect and complete they consist: 1st, of a *pistil* in the centre, consisting of one or more *carpels*, each containing the germ of one or more seeds; 2nd, of one or more *stamens* outside the pistil, whose action is necessary to *fertilize* the pistil or enable it to ripen its seed; 3rd, of a *perianth* or *floral envelope*, which usually encloses the stamens and pistil when young, and expands and exposes them to view when fully formed. This complete perianth is double: the outer one, called *Calyx*, is usually more green and leaf-like; the inner one, called the *Corolla*, more conspicuous, and variously coloured. It is the perianth, and especially the corolla, as the most showy part, that is generally called the flower in popular language.

(5) The **Fruit,** consisting of the pistil or its lower portion, which persists or remains attached to the plant after the remainder of the flower has withered and fallen off. It enlarges and alters more or less in shape or consistence, becomes a *seed-vessel*, enclosing the seed until it is ripe, when it either opens to discharge the seed or falls to the ground with the seed. In popular language the term *fruit* is often limited to such seed-vessels as are or look juicy and eatable. Botanists give that name to all seed-vessels.

16. The herbaceous perennial resembles the annual during the first year of its growth; but it also forms (usually towards the close of the season), on its *stock* (the portion of the stem and root which does not die), one or more *buds*, either exposed, and then popularly called *eyes*, or concealed among leaves. These buds, called *leaf-buds*, to distinguish them from *flower-buds* or unopened flowers, are future branches as yet undeveloped; they remain dormant through the winter, and the following spring grow out into new stems bearing leaves and flowers like those of the preceding year, whilst the lower part of the stock emits fresh roots to replace those which had perished at the same time as the stems.

17. Shrubs and trees form similar leaf-buds either at the extremity of their branches, or along the branches of the year. In the latter case these buds are usually *axillary*, that is, they appear in the *axil* of each leaf, *i. e.* in the angle formed by the leaf and the branch. When they appear at any other part of the plant, they are called *adventitious*. If these buds by producing roots (19) become distinct plants before separating from the parent, or if adventitious leaf-buds are produced in the place of flowers or seeds, the plant is said to be *viniparous* or *proliferous*.

§ 2. *The Root.*

18. **Roots** ordinarily produce neither buds, leaves, nor flowers. Their branches, called *fibres* when slender and long, proceed irregularly from any part of their surface.

19. Although roots proceed usually from the base of the stem or stock, they may also be produced from the base of any bud, especially if the bud lie along the ground, or is otherwise placed by nature or art in circumstances favourable for their development, or indeed occasionally from almost any part of the plant. They are then often distinguished as *adventitious*, and this term is by some applied to all roots which are not in prolongation of the original radicle.

20. **Roots** are

fibrous, when they consist chiefly of slender fibres.

tuberous, when either the main root or its branches are thickened into one or more short fleshy or woody masses called *tubers* (25).

taproots, when the main root descends perpendicularly into the earth, emitting only very small fibrous branches.

21. The stock of a herbaceous perennial, or the lower part of the stem of an annual or perennial, or the lowest branches of a plant, are sometimes underground and assume the appearance of a root. They then take the name of *rhizome*. The rhizome may always be distinguished from the true root by the presence or production of one or more buds, or leaves, or scales.

§ 3. *The Stock.*

22. The **Stock** of a herbaceous perennial, in its most complete state, includes a small portion of the summits of the previous year's roots, as well as of the base of the previous year's stems. Such stocks will increase yearly, so as at length to form dense tufts. They will often preserve through the winter a few leaves, amongst which are placed the buds which grow out into stems the following year, whilst the under side of the stock emits new roots from or amongst the remains of the old ones. These perennial stocks only differ from the permanent base of an undershrub in the shortness of the perennial part of the stems and in the texture usually less woody.

23. In some perennials, however, the stock consists merely of a branch, which proceeds in autumn from the base of the stem either aboveground or underground, and produces one or more buds. This branch, or a portion of it, alone survives the winter. In the following year its buds produce the new stem and roots, whilst the rest of the plant, even the branch on which these buds were formed, has died away. These *annual stocks*, called sometimes *hybernacula*, *offsets*, or *stolons*, keep up the communication between the annual stem and root of one year and those of the following year, thus forming altogether a perennial plant.

24. The stock, whether annual or perennial, is often entirely underground or root-like. This is the *rootstock*, to which some botanists limit the meaning of the term *rhizome*. When the stock is entirely root-like, it is popularly called the *crown* of the root.

25. The term *tuber* is applied to a short, thick, more or less succulent rootstock or rhizome, as well as to a root of that shape (20), although some botanists propose to restrict its meaning to the one or to the other. An Orchis tuber, called by some a *knob*, is an annual tuberous rootstock with one bud at the top. A potato is an annual tuberous rootstock with several buds.

26. A *bulb* is a stock of a shape approaching to globular, usually rather conical above and flattened underneath, in which the bud or buds are concealed, or nearly so, under *scales*. These scales are the more or less thickened bases of the decayed leaves of the preceding year, or of the undeveloped leaves of the future year, or of both. Bulbs are annual or perennial, usually underground or close to the ground, but occasionally buds in the axils of the upper leaves become transformed into bulbs. Bulbs are said to be *scaly* when their scales are thick and loosely imbricated, *tunicated* when the scales are thinner, broader, and closely rolled round each other in concentric layers.

27. A *corm* is a tuberous rootstock, usually annual, shaped like a bulb, but in which the bud or buds are not covered by scales, or of which the scales are very thin and membranous.

§ 4. *The Stem.*

28. **Stems** are

erect, when they ascend perpendicularly from the root or stock; *twiggy* or *virgate*, when at the same time they are slender, stiff, and scarcely branched.

sarmentose, when the branches of a woody stem are long and weak, although scarcely climbing.

decumbent or *ascending*, when they spread horizontally, or nearly so, at the base, and then turn upwards and become erect.

procumbent, when they spread along the ground the whole or the greater portion of their length; *diffuse*, when at the same time very much and rather loosely branched.

prostrate, when they lie still closer to the ground.

creeping, when they emit roots at their nodes. This term is also frequently applied to any rhizomes or roots which spread horizontally.

tufted or *cæspitose*, when very short, close, and many together from the same stock.

29. Weak climbing stems are said to *twine*, when they support themselves by winding spirally round any object; such stems are also called *voluble*. When they simply climb without twining, they support themselves by their leaves, or by special clasping organs called *tendrils* (169), or sometimes, like the Ivy, by small root-like excrescences.

30. *Suckers* are young plants formed at the end of creeping, underground rootstocks. *Scions*, *runners*, and *stolons*, or *stoles*, are names given to young plants formed at the end or at the nodes (31) of branches or stocks creeping wholly or partially aboveground, or sometimes to the creeping stocks themselves.

31. A *node* is a point of the stem or its branches at which one or more leaves, branches, or leaf-buds (16) are given off. An *internode* is the portion of the stem comprised between two nodes.

32. **Branches** or **leaves** are

opposite, when two proceed from the same node on opposite sides of the stem.

whorled or *verticillate* (in a *whorl* or *verticil*), when several proceed from the same node, arranged regularly round the stem; *geminate*, *ternate*, *fascicled*, or *fasciculate* when two, three, or more proceed from the same node on the same side of the stem. A tuft of fasciculate leaves is usually in fact a leafy branch, so short that the leaves appear to proceed all from the same point.

alternate, when one only proceeds from each node, one on one side and the next above or below, though usually not in the same vertical line.

decussate, when opposite, but each pair placed at right-angles to the next pair above or below it; *distichous*, when regularly arranged one above another in two opposite rows, one on each side of the stem; *tristichous*, when in three rows, etc. (92).

scattered, when irregularly arranged round the stem; frequently, however, botanists apply the term *alternate* to all branches or leaves that are neither opposite nor whorled.

secund, when all start from or are turned to one side of the stem.

33. **Branches** are *dichotomous*, when several times forked, the two branches of each fork being nearly equal; *trichotomous*, when there are three nearly equal branches at each division instead of two; but when the middle branch is evidently the principal one, the stem is usually said to have two opposite branches; *umbellate*, when divided in the same manner into several nearly equal branches proceeding from the same point. If however the central branch is larger than the two or more lateral ones, the stem is said to have opposite or whorled branches, as the case may be.

34. A *culm* is a name sometimes given to the stem of Grasses, Sedges, and some other Monocotyledonous plants.

§ 5. *The Leaves.*

35. The ordinary or perfect **Leaf** consists of a flat *blade* or *lamina*, usually green, and more or less horizontal, attached to the stem by a stalk called a *footstalk* or *petiole*. When the form or dimensions of a leaf are spoken of, it is generally the blade that is meant, without the petiole or stalk.

36. The end by which a leaf, a part of the flower, a seed, or any other organ, is

attached to the stem or other organ, is called its *base*, the opposite end is its *apex* or summit, excepting sometimes in the case of anther-cells (115).

37. **Leaves** are

sessile, when the blade rests on the stem without the intervention of a petiole.

amplexicaul or *stem-clasping*, when the sessile base of the blade clasps the stem horizontally.

perfoliate, when the base of the blade not only clasps the stem, but closes round it on the opposite side, so that the stem appears to pierce through the blade.

decurrent, when the edges of the leaf are continued down the stem so as to form raised lines or narrow appendages, *called wings*.

sheathing, when the base of the blade, or of the more or less expanded petiole, forms a vertical sheath round the stem for some distance above the node.

38. Leaves and flowers are called *radical*, when inserted on a rhizome or stock, or so close to the base of the stem as to appear to proceed from the root, rhizome, or stock; *cauline*, when inserted on a distinct stem. Radical leaves are *rosulate* when they spread in a circle on the ground.

39. **Leaves** are

simple and *entire*, when the blade consists of a single piece, with the margin nowhere indented, *simple* being used in opposition to *compound*, *entire* in opposition to *dentate*, *lobed*, or *divided*.

ciliate, when bordered with thick hairs or fine hair-like teeth.

dentate or *toothed*, when the margin is only cut a little way in, into what have been compared to teeth. Such leaves are *serrate*, when the teeth are regular and pointed like the teeth of a saw; *crenate*, when regular and blunt or rounded (compared to the battlements of a tower); *serrulate*, and *crenulate*, when the serratures or crenatures are small; *sinuate*, when the teeth are broad, not deep, and irregular (compared to bays of the coast); *wavy* or *undulate*, when the edges are not flat, but bent up and down (compared to the waves of the sea).

lobed or *cleft*, when more deeply indented or divided, but so that the incisions do not reach the midrib or petiole. The portions thus divided take the name of *lobes*. When the lobes are narrow and very irregular, the leaves are said to be *laciniate*. The spaces between the teeth or lobes are called *sinuses*.

divided or *dissected*, when the incisions reach the midrib or petiole, but the parts so divided off, called *segments*, do not separate from the petiole, even when the leaf falls, without tearing.

compound, when divided to the midrib or petiole, and the parts so divided off, called *leaflets*, separate, at least at the fall of the leaf, from the petiole, as the whole leaf does from the stem, without tearing. The common stalk upon which the leaflets are inserted is called the *common petiole* or the *rhachis*; the separate stalk of each leaflet is a *petiolule*.

40. Leaves are more or less marked by *veins*, which, starting from the stalk, diverge or branch as the blade widens, and spread all over it more or less visibly. The principal ones, when prominent, are often called *ribs* or *nerves*, the smaller branches only then retaining the name of *veins*, or the latter are termed *veinlets*. The smaller veins are often connected together like the meshes of a net, they are then said to *anastomose*, and the leaf is said to be *reticulate* or *net-veined*. When one principal vein runs direct from the stalk towards the summit of the leaf, it is called the *midrib*. When several start from the stalk, diverge slightly without branching, and converge again towards the summit, they are said to be *parallel*, although not mathematically so. When 3 or 5 or more ribs or nerves diverge *from the base*, the leaf is said to be 3-*nerved*, 5-*nerved*, etc., but if the lateral ones diverge from the midrib a little above the base, the leaf is, *triplinerved*, *quintuplinerved*, etc. The arrangement of the veins of a leaf is called their *venation*.

41. The **Leaflets, Segments, Lobes,** or **Veins** of leaves are

pinnate (feathered), when there are several succeeding each other on each side of the midrib or petiole, compared to the branches of a feather. A pinnately lobed or divided leaf is called *lyrate* when the terminal lobe or segment is much larger and broader than the lateral ones, compared, by a stretch of imagination, to a lyre; *run-*

cinate, when the lateral lobes are curved backwards towards the base of the leaf; *pectinate*, when the lateral lobes are numerous, narrow, and regular, like the teeth of a comb.

palmate or *digitate*, when several diverge from the same point, compared to the fingers of the hand.

ternate, when three only start from the same point, in which case the distinction between the palmate and pinnate arrangement often ceases, or can only be determined by analogy with allied plants. A leaf with ternate lobes is called *trifid*. A leaf with three leaflets is sometimes improperly called a ternate leaf: it is the leaflets that are ternate; the whole leaf is *trifoliolate*. Ternate leaves are leaves growing three together.

pedate, when the division is at first ternate, but the two outer branches are forked, the outer ones of each fork again forked, and so on, and all the branches are near together at the base, compared vaguely to the foot of a bird.

42. Leaves with pinnate, palmate, pedate, etc., leaflets, are usually for shortness called *pinnate, palmate, pedate*, etc., *leaves*. If they are so cut into segments only, they are usually said to be *pinnatisect, palmatisect, pedatisect*, etc., although the distinction between segments and leaflets is often unheeded in descriptions, and cannot indeed always be ascertained. If the leaves are so cut only into lobes, they are said to be *pinnatifid, palmatifid, pedatifid*, etc.

43. The teeth, lobes, segments, or leaflets may be again toothed, lobed, divided, or compounded. Some leaves are even three or more times divided or compounded. In the latter case they are termed *decompound*. When twice or thrice pinnate (*bipinnate* or *tripinnate*), each primary or secondary division, with the leaflets it comprises, is called a *pinna*. When the pinna of a leaf or the leaflets of a pinna are in pairs, without an odd terminal pinna or leaflet, the leaf or pinna so divided is said to be *abruptly pinnate*; if there is an odd terminal pinna or leaflet, the leaf or pinna is *unequally pinnate* (*imparipinnatum*).

44. The number of leaves or their parts is expressed adjectively by the following numerals, derived from the Latin:—

uni-, 1-,	bi-, 2-,	tri-, 3-,	quadri-, 4-,	quinque-, 5-,	sex-, 6,	septem-, 7,	octo-, 8-,	novem-, 9-,	decem-, 10-,	multi-, *many*-

prefixed to a termination, indicating the particular kind of part referred to. Thus—

unidentate, bidentate, multidentate, mean one-toothed, two-toothed, many-toothed, etc.

bifid, trifid, multifid, mean two-lobed, three-lobed, many-lobed, etc.

unifoliolate, bifoliolate, multifoliolate, mean having one leaflet, two leaflets, many leaflets, etc.

unifoliate, bifoliate, multifoliate, mean having one leaf, two leaves, many leaves, etc.

biternate and *triternate*, mean twice or thrice ternately divided.

unijugate, bijugate, multijugate, etc., pinnæ or leaflets, mean that they are in one, two, many, etc., pairs (*juga*).

45. **Leaves** or their parts, when **flat**, or any other flat organs in plants, are

linear, when long and narrow, at least four or five times as long as broad, falsely compared to a mathematical line, for a linear leaf has always a perceptible breadth.

lanceolate, when about three or more times as long as broad, broadest below the middle, and tapering towards the summit, compared to the head of a lance.

cuneate, when broadest above the middle, and tapering towards the base, compared to a wedge with the point downwards; when very broadly cuneate and rounded at the top, it is often called *flabelliform* or *fan-shaped*.

spathulate, when the broad part near the top is short, and the narrow tapering part long, compared to a spathula or flat ladle.

ovate, when scarcely twice as long as broad, and rather broader below the middle, compared to the longitudinal section of an egg; *obovate* is the same form, with the broadest part above the middle.

deltoid, triangular, in the form of the Greek letter Δ.

orbicular, *oval*, *oblong*, *elliptical*, *rhomboidal*, etc., when compared to the corresponding mathematical figures.

transversely oblong, or *oblate*, when conspicuously broader than long.

falcate, when curved like the blade of a scythe.

46. Intermediate forms between any two of the above are expressed by combining two terms. Thus, a *linear-lanceolate* leaf is long and narrow, yet broader below the middle, and tapering to a point; a *linear-oblong* one is scarcely narrow enough to be called linear, yet too narrow to be strictly oblong, and does not conspicuously taper either towards the summit or towards the base.

47. The *apex* or *summit* of a leaf is

acute or *pointed*, when it forms an acute angle or tapers to a point.

obtuse or *blunt*, when it forms a very obtuse angle, or more generally when it is more or less rounded at the top.

acuminate or *cuspidate*, when suddenly narrowed at the top, and then more or less prolonged into an *acumen* or *point*, which may be acute or obtuse, linear or tapering. Some botanists make a slight difference between the *acuminate* and *cuspidate* apex, the acumen being more distinct from the rest of the leaf in the latter case than in the former; but in general the two terms are used in the same sense, some preferring the one and some the other.

truncate, when the end is cut off square.

retuse, when very obtuse or truncate, and slightly indented.

emarginate or *notched*, when more decidedly indented at the end of the midrib; *obcordate*, if at the same time approaching the shape of a heart with its point downwards.

mucronate, when the midrib is produced beyond the apex in the form of a small point.

aristate, when the point is fine like a hair.

48. The base of the leaf is liable to the same variations of form as the apex, but the terms more commonly used are *tapering* or *narrowed* for acute and acuminate, *rounded* for obtuse, and *cordate* for emarginate. In all cases the petiole or point of attachment prevent any such absolute termination at the base as at the apex.

49. A leaf may be *cordate* at the base whatever be its length or breadth, or whatever the shape of the two lateral lobes, called *auricles* (or *little ears*), formed by the indenture or notch, but the term *cordiform* or *heart-shaped* leaf is restricted to an ovate and acute leaf, cordate at the base, with rounded auricles. The word auricles is more particularly used as applied to sessile and stem-clasping leaves.

50. If the auricles are pointed, the leaf is more particularly called *auriculate*; it is moreover said to be *sagittate*, when the points are directed downwards, compared to an arrow-head; *hastate*, when the points diverge horizontally, compared to a halbert.

51. A *reniform* leaf is broader than long, slightly but broadly cordate at the base, with rounded auricles, compared to a kidney.

52. In a *peltate* leaf, the stalk, instead of proceeding from the lower edge of the blade, is attached to the under surface, usually near the lower edge, but sometimes in the very centre of the blade. The peltate leaf has usually several principal nerves radiating from the point of attachment, being, in fact, a cordate leaf, with the auricles united.

53. All these modifications of division and form in the leaf pass so gradually one into the other that it is often difficult to say which term is the most applicable—whether the leaf be toothed or lobed, divided or compound, oblong or lanceolate, obtuse or acute, etc. The choice of the most apt expression will depend on the skill of the describer.

54. **Leaves,** when **solid, Stems, Fruits, Tubers,** and other parts of plants, when not flattened like ordinary leaves, are

setaceous or *capillary*, when very slender like bristles or hairs.

acicular, when very slender, but stiff and pointed like needles.

subulate, when rather thicker and firmer like awls.

linear, when at least four times as long as thick; *oblong*, when from about two to

about four times as long as thick, the terms having the same sense as when applied to flat surfaces.

ovoid, when egg-shaped, with the broad end downwards, *obovoid* if the broad end is upwards; these terms corresponding to *ovate* and *obovate* shapes in flat surfaces.

globular or spherical, when corresponding to *orbicular* in a flat surface. *Round* applies to both.

turbinate, when shaped like a top.

conical, when tapering upwards; *obconical*, when tapering downwards, if in both cases a transverse section shows a circle.

pyramidal, when tapering upwards; *obpyramidal*, when tapering downwards, if in both cases a transverse section shows a triangle or polygon.

fusiform, or spindle-shaped, when tapering at both ends; *cylindrical* when not tapering at either end, if in both cases the transverse section shows a circle, or sometimes irrespective of the transverse shape.

terete, when the transverse section is not angular; *trigonous*, *triquetrous*, if the transverse section shows a triangle, irrespective in both cases of longitudinal form.

compressed, when more or less flattened laterally; *depressed*, when more or less flattened vertically, or at any rate at the top; *obcompressed* (in the achenes of *Compositæ*), when flattened from front to back.

articulate or *jointed*, if at any period of their growth (usually when fully formed and approaching their decay, or in the case of fruits when quite ripe) they separate, without tearing, into two or more pieces placed end to end. The joints where they separate are called *articulations*, each separate piece an *article*. The name of *joint* is, in common language, given both to the articulation and the article, but more especially to the former. Some modern botanists, however, propose to restrict it to the article, giving the name of *joining* to the articulation.

didymous, when slightly two-lobed, with rounded obtuse lobes.

moniliform, *torulose*, or beaded, when much contracted at regular intervals, but not separating spontaneously into articles.

55. In their consistence **Leaves** or other organs are

fleshy, when thick and soft; *succulent* is generally used in the same sense, but implies the presence of more juice.

coriaceous, when firm and dry, or very tough, of the consistence of leather.

crustaceous, when firm and brittle.

chartaceous, or *papyraceous*, when of the consistence of paper.

membranous, when thin and not stiff.

scarious or *scariose*, when very thin, more or less transparent and not green, yet rather stiff.

56. The terms applied botanically to the consistence of solids are those in general use in common language.

57. The mode in which unexpanded leaves are disposed in the leaf-bud is called their *vernation* or *præfoliation*; it varies considerably, and technical terms have been proposed to express some of its varieties, but it has been hitherto rarely noticed in descriptive botany.

§ 6. *Scales, Bracts, and Stipules.*

58. **Scales** (*Squamæ*) are leaves very much reduced in size, usually sessile, seldom green or capable of performing the respiratory functions of leaves. In other words, they are organs resembling leaves in their position on the plant, but differing in size, colour, texture, and functions. They are most frequent on the stock of perennial plants, or at the base of annual branches, especially on the buds of future shoots, when they serve apparently to protect the dormant living germ from the rigour of winter. In the latter case they are usually short, broad, close together, and more or less *imbricated*, that is, overlapping each other like the tiles of a roof. It is this arrangement as well as their usual shape that has suggested the name of *scales*, borrowed from the scales of a fish. Imbricated scales, bracts, or leaves, are said to be *squarrose*, when their tips are pointed and very spreading or recurved.

59. Sometimes, however, most or all the leaves of the plant are reduced to small

scales, in which case they do not appear to perform any particular function. The name of *scales* is also given to any small broad scale-like appendages or reduced organs, whether in the flower or any other part of the plant.

60. **Bracts** (*Bracteæ*) are the upper leaves of a plant in flower (either all those of the flowering branches, or only one or two immediately under the flower), when different from the stem-leaves in size, shape, colour, or arrangement. They are generally much smaller and more sessile. They often partake of the colour of the flower, although they very frequently also retain the green colour of the leaves. When small they are often called *scales*.

61. *Floral leaves* or *leafy bracts* are generally the lower bracts or the upper leaves at the base of the flowering branches, intermediate in size, shape, or arrangement, between the stem-leaves and the upper bracts.

62. *Bracteoles* are the one or two last bracts under each flower, when they differ materially in size, shape, or arrangement from the other bracts.

63. **Stipules** are leaf-like or scale-like appendages at the base of the leaf-stalk, or on the node of the stem. When present there are generally two, one on each side of the leaf, and they sometimes appear to protect the young leaf before it is developed. They are however exceedingly variable in size and appearance, sometimes exactly like the true leaves except that they have no buds in their axils, or looking like the leaflets of a compound leaf, sometimes apparently the only leaves of the plant; generally small and narrow, sometimes reduced to minute scales, spots, or scars, sometimes united into one opposite the leaf, or more or less united with, or *adnate* to the petiole, or quite detached from the leaf, and forming a ring or sheath round the stem in the axil of the leaf. In a great number of plants they are entirely wanting.

64. *Stipellæ*, or secondary stipules, are similar organs, sometimes found on compound leaves at the points where the leaflets are inserted.

65. When scales, bracts, or stipules, or almost any part of the plant besides leaves and flowers are stalked, they are said to be *stipitate*, from *stipes*, a *stalk*.

§ 7. *Inflorescence and its Bracts.*

66. The **Inflorescence** of a plant is the arrangement of the flowering branches, and of the flowers upon them. *An Inflorescence* is a flowering branch, or the flowering summit of a plant above the last stem-leaves, with its branches, bracts, and flowers.

67. A single flower, or an inflorescence, is *terminal* when at the summit of a stem or leafy branch, *axillary* when in the axil of a stem-leaf, *leaf-opposed* when opposite to a stem-leaf. The inflorescence of a plant is said to be *terminal* or *determinate* when the main stem and principal branches end in a flower or inflorescence (not in a leaf-bud), *axillary* or *indeterminate* when all the flowers or inflorescences are axillary, the stem or branches ending in leaf-buds.

68. A *Peduncle* is the stalk of a solitary flower, or of an inflorescence; that is to say, the portion of the flowering branch from the last stem-leaf to the flower, or to the first ramification of the inflorescence, or even up to its last ramifications; but the portion extending from the first to the last ramifications or the axis of inflorescence is often distinguished under the name of *rhachis*.

69. A *Scape* or *radical Peduncle* is a leafless peduncle proceeding from the stock, or from near the base of the stem, or apparently from the root itself.

70. A *Pedicel* is the last branch of an inflorescence, supporting a single flower.

71. The branches of inflorescence may be, like those of stems, opposite, alternate, etc. (32, 33), but very often their arrangement is different from that of the leafy branches of the same plant.

72. **Inflorescence** is

centrifugal, when the terminal flower opens first, and those on the lateral branches are successively developed.

centripetal, when the lowest flowers open first, and the main stem continues to elongate, developing fresh flowers.

73. Determinate inflorescence is usually centrifugal. Indeterminate inflorescence is

always centripetal. Both inflorescences may be combined on one plant, for it often happens that the main branches of an inflorescence are centripetal, whilst the flowers on the lateral branches are centrifugal; or *vice versâ*.

74. An **Inflorescence** is

a *Spike*, or *spicate*, when the flowers are sessile along a simple undivided axis or rhachis.

a *Raceme*, or *racemose*, when the flowers are borne on pedicels along a single undivided axis or rhachis.

a *Panicle*, or *paniculate*, when the axis is divided into branches bearing two or more flowers.

a *Head*, or *capitate*, when several sessile or nearly sessile flowers are collected into a compact head-like cluster. The short, flat, convex or conical axis on which the flowers are seated, is called the *receptacle*, a term also used for the torus of a single flower (135). The very compact flower-heads of *Compositæ* are often termed *compound flowers*.

an *Umbel*, or *umbellate*, when several branches or pedicels appear to start from the same point and are nearly of the same length. It differs from the head, like the raceme from the spike, in that the flowers are not sessile. An umbel is said to be *simple*, when each of its branches or *rays* bears a single flower; *compound*, when each ray bears a *partial umbel* or *umbellule*.

a *Corymb*, or *corymbose*, when the branches and pedicels, although starting from different points, all attain the same level, the lower ones being much longer than the upper. It is a flat-topped or *fastigiate* panicle.

a *Cyme*, or *cymose*, when branched and centrifugal. It is a centrifugal panicle, and is often corymbose. The central flower opens first. The lateral branches successively developed are usually forked or opposite (dichotomous or trichotomous), but sometimes after the first forking the branches are no longer divided, but produce a succession of pedicels on their upper side forming apparently unilateral centripetal racemes; whereas if attentively examined, it will be found that each pedicel is at first terminal, but becomes lateral by the development of one outer branch only, immediately under the pedicel. Such branches, when in bud, are generally rolled back at the top, like the tail of a scorpion, and are thence called *scorpioid*.

a *Thyrsus*, or *thyrsoid*, when cymes, usually opposite, are arranged in a narrow pyramidal panicle.

75. There are numerous cases where inflorescences are intermediate between some two of the above, and are called by different botanists by one or the other name, according as they are guided by apparent or by theoretical similarity. A spike-like panicle, where the axis is divided into very short branches forming a cylindrical compact inflorescence, is called sometimes a spike, sometimes a panicle. If the flowers are in distinct clusters along a simple axis, the inflorescence is described as an *interrupted* spike or raceme, according as the flowers are nearly sessile or distinctly pedicellate; although when closely examined the flowers will be found to be inserted not on the main axis, but on a very short branch, thus, strictly speaking, constituting a panicle.

76. The *catkins* (*amenta*) of *Amentaceæ*, the *spadices* of several Monocotyledons, the *ears* and *spikelets* of Grasses are forms of the spike.

77. **Bracts** are generally placed singly under each branch of the inflorescence, and under each pedicel; bracteoles are usually two, one on each side, on the pedicel or close under the flower, or even upon the calyx itself; but bracts are also frequently scattered along the branches without axillary pedicels; and when the differences between the bracts and bracteoles are trifling or immaterial, they are usually all called bracts.

78. When these bracts appear to proceed from the same point, they will, on examination, be found to be really either one bract and two stipules, or one bract with two bracteoles in its axil. When two bracts appear to proceed from the same point, they will usually be found to be the stipules of an undeveloped bract, unless the branches of the inflorescence are opposite, when the bracts will of course be opposite also.

79. When several bracts are collected in a whorl, or are so close together as to appear whorled, or are closely imbricated round the base of a head or umbel, they are collectively called an *Involucre*. The bracts composing an involucre are described

under the names of *leaves*, *leaflets*, *bracts*, or *scales*, according to their appearance. *Phyllaries* is a useless term, lately introduced for the bracts or scales of the involucre of *Compositæ*. An *Involucel* is the involucre of a partial umbel.

80. When several very small bracts are placed round the base of a calyx or of an involucre, they have been termed a *calycule*, and the calyx or involucre said to be *calyculate*, but these terms are now falling into disuse, as conveying a false impression. When the bracts are whorled and inserted upon the calyx, they form what is frequently called an *epicalyx*.

81. A *Spatha* is a bract or floral leaf enclosing the inflorescence of some Monocotyledons.

82. *Paleæ*, *pales*, or *Chaff*, are the inner bracts or scales in *Compositæ*, *Gramineæ*, and some other plants, when of a thin yet stiff consistence, usually narrow and of a pale colour.

83. *Glumes* are the bracts enclosing the flowers of *Cyperaceæ* and *Gramineæ*.

§ 8. *The Flower in General.*

84. A *complete* **Flower** (15) is one in which the calyx, corolla, stamens, and pistil are all present; a *perfect* flower, one in which all these organs, or such of them as are present, are capable of performing their several functions. Therefore, properly speaking, an *incomplete* flower is one in which any one or more of these organs is wanting; and an *imperfect* flower, one in which any one or more of these organs is so altered as to be incapable of properly performing its functions. These imperfect organs are said to be *abortive* if much reduced in size or efficiency, *rudimentary* if so much so as to be scarcely perceptible. But, in many works, the term *incomplete* is specially applied to those flowers in which the perianth is simple or wanting, and *imperfect* to those in which either the stamens or pistil are imperfect or wanting.

85. A **Flower** is

dichlamydeous, when the perianth is double, both calyx and corolla being present and distinct.

monochlamydeous, when the perianth is single, whether by the union of the calyx and corolla, or the deficiency of either.

asepalous, when there is no calyx.

apetalous, when there is no corolla.

naked or *achlamydeous*, when there is no perianth at all.

hermaphrodite or *bisexual*, when both stamens and pistil are present and perfect.

male or *staminate*, when there are one or more stamens, but either no pistil at all or an imperfect one.

female or *pistillate*, when there is a pistil, but either no stamens at all, or only imperfect ones.

neuter, when both stamens and pistil are imperfect or wanting.

barren or *sterile*, when from any cause it produces no seed.

fertile, when it does produce seed. In some works the terms *barren*, *fertile*, and *perfect* are also used respectively as synonyms of *male*, *female*, and *hermaphrodite*.

86. The flowers of a plant or species are said collectively to be *unisexual* or *diclinous* when the flowers are all either male or female.

monœcious, when the male and female flowers are distinct, but on the same plant.

diœcious, when the male and female flowers are on distinct plants.

polygamous, when there are male, female, and hermaphrodite flowers on the same or on distinct plants.

87. A head of flowers is *heterogamous* when male, female, hermaphrodite, and neuter flowers, or any two or three of them, are included in one head; *homogamous*, when all the flowers included in one head are alike in this respect. A spike or head of flowers is *androgynous* when male and female flowers are mixed in it. These terms are only used in the case of very few Natural Orders.

88. As the scales of buds are leaves undeveloped or reduced in size and altered in shape and consistence, and bracts are leaves likewise reduced in size, and occasionally altered in colour; so the parts of the flower are considered as leaves still further altered

in shape, colour, and arrangement round the axis, and often more or less combined with each other. The details of this theory constitute the comparatively modern branch of botany called *Vegetable Metamorphosis* or *Homology*, sometimes improperly termed *Morphology* (8).

89. To understand the arrangement of the floral parts, let us take a *complete* flower, in which moreover all the parts are *free* from each other, *definite* in number, *i.e.* always the same in the same species, and *symmetrical* or *isomerous*, *i.e.* when each whorl consists of the same number of parts.

90. Such a complete symmetrical flower consists usually of either four or five whorls of altered leaves (88), placed immediately one within the other.

The **Calyx** forms the outer whorl. Its parts are called *sepals*.

The **Corolla** forms the next whorl. Its parts, called *petals*, usually *alternate* with the sepals; that is to say, the centre of each petal is immediately over or within the interval between two sepals.

The **Stamens** form one or two whorls within the petals. If two, those of the outer whorl (the *outer stamens*) alternate with the petals, and are consequently opposite to, or over the centre of the sepals; those of the inner whorl (the *inner stamens*) alternate with the outer ones, and are therefore opposite to the petals. If there is only one whorl of stamens, they most frequently alternate with the petals; but sometimes they are opposite the petals and alternate with the sepals.

The **Pistil** forms the inner whorl; its carpels usually alternate with the inner row of stamens.

91. In an axillary or lateral flower the *upper* parts of each whorl (sepals, petals, stamens, or carpels) are those which are next to the main axis of the stems or branch, the *lower* parts those which are furthest from it; the intermediate ones are said to be *lateral*. The words *anterior* (front) and *posterior* (back) are often used for lower and upper respectively, but their meaning is sometimes reversed if the writer supposes himself in the centre of the flower instead of outside of it.

92. The number of parts in each whorl of a flower is expressed adjectively by the following numerals derived from the Greek:—

mono-,	di-,	tri-,	tetra-,	penta-,	hexa-,	hepta-,	octo-,	ennea-,	deca-, etc.,	poly-
1-,	2-,	3-,	4-,	5-,	6-,	7-,	8-,	9-,	10-,	*many*-

prefixed to a termination indicating the whorl referred to.

93. Thus, a **Flower** is

disepalous, *trisepalous*, *tetrasepalous*, *polysepalous*, etc., according as there are 2, 3, 4, or many (or an indefinite number of) sepals.

dipetalous, *tripetalous*, *polypetalous*, etc., according as there are 2, 3, or many petals.

diandrous, *triandrous*, *polyandrous*, etc., according as there are 2, 3, or many stamens.

digynous, *trigynous*, *polygynous*, etc., according as there 2, 3, or many carpels.

And generally (if symmetrical), *dimerous*, *trimerous*, *polymerous*, etc., according as they are 2, 3, or many (or an indefinite number of) parts to each whorl.

94. Flowers are *unsymmetrical* or *anisomerous*, strictly speaking, when any one of the whorls has a different number of parts from any other; but when the carpels alone are reduced in number, the flower is still frequently called symmetrical or isomerous, if the calyx, corolla, and staminal whorls have all the same number of parts.

95. Flowers are *irregular* when the parts of any one of the whorls are unequal in size, dissimilar in shape, or do not spread regularly round the axis at equal distances. It is however more especially irregularity of the corolla that is referred to in descriptions. A slight inequality in size or direction in the other whorls does not prevent the flower being classed as *regular*, if the corolla or perianth is conspicuous and regular.

§ 9. *The Calyx and Corolla, or Perianth.*

96. The **Calyx** (90) is usually green, and smaller than the corolla; sometimes very minute, rudimentary, or wanting, sometimes very indistinctly whorled, or not whorled

at all, or in two whorls, or composed of a large number of sepals, of which the outer ones pass gradually into bracts, and the inner ones into petals.

97. The **Corolla** (90) is usually coloured, and of a more delicate texture than the calyx, and, in popular language, is often more specially meant by the *flower*. Its petals are more rarely in two whorls, or indefinite in number, and the whorl more rarely broken than in the case of the calyx, at least when the plant is in a natural state. *Double flowers* are in most cases an accidental deformity or monster in which the ordinary number of petals is multiplied by the conversion of stamens, sepals, or even carpels into petals, by the division of ordinary petals, or simply by the addition of supernumerary ones. Petals are also sometimes very small, rudimentary, or entirely deficient.

98. In very many cases, a so-called *simple perianth* (15) (of which the parts are usually called *leaves* or *segments*) is one in which the sepals and petals are similar in form and texture, and present apparently a single whorl. But if examined in the young bud, one half of the parts will generally be found to be placed outside the other half, and there will frequently be some slight difference in texture, size, and colour, indicating to the close observer the presence of both calyx and corolla. Hence much discrepancy in descriptive works. Where one botanist describes a simple perianth of six segments, another will speak of a double perianth of three sepals and three petals.

99. The following terms and prefixes, expressive of the modifications of form and arrangement of the corolla and its petals, are equally applicable to the calyx and its sepals, and to the simple perianth and its segments.

100. The Corolla is said to be *monopetalous* when the petals are united, either entirely or at the base only, into a cup, tube, or ring; *polypetalous* when they are all free from the base. These expressions, established by a long usage, are not strictly correct, for *monopetalous* (consisting of a single petal) should apply rather to a corolla really reduced to a single petal, which would then be on one side of the axis; and *polypetalous* is sometimes used more appropriately for a corolla with an indefinite number of petals. Some modern botanists have therefore proposed the term *gamopetalous* for the corolla with united petals, and *dialypetalous* for that with free petals; but the old established expressions are still the most generally used.

101. When the petals are partially united, the lower entire portion of the corolla is called the *tube*, whatever be its shape, and the free portions of the petals are called the *teeth*, *lobes*, or *segments* (39), according as they are short or long in proportion to the whole length of the corolla. When the tube is excessively short, the petals appear at first sight free, but their slight union at the base must be carefully attended to, being of importance in classification.

102. The **Æstivation** of a corolla is the arrangement of the petals, or of such portion of them as is free, in the unexpanded bud. It is

valvate, when they are strictly whorled in their whole length, their edges being placed against each other without overlapping. If the edges are much inflexed, the æstivation is at the same time *induplicate*; *involute*, if the margins are rolled inward; *reduplicate*, if the margins project outwards into salient angles; *revolute*, if the margins are rolled outwards; *plicate*, if the petals are folded in longitudinal plaits.

imbricate, when the whorl is more or less broken by some of the petals being outside the others, or by their overlapping each other at least at the top. Five-petaled imbricate corollas are *quincuncially* imbricate when one petal is outside, and an adjoining one wholly inside, the three others intermediate and overlapping on one side; *bilabiate*, when two adjoining ones are inside or outside the three others. Imbricate petals are described as *crumpled* (*corrugate*) when puckered irregularly in the bud.

twisted, *contorted*, or *convolute*, when each petal overlaps an adjoining one on one side, and is overlapped by the other adjoining one on the other side. Some botanists include the twisted æstivation in the general term *imbricate*; others carefully distinguish the one from the other.

103. In a few cases the overlapping is so slight that the three æstivations cannot easily be distinguished one from the other; in a few others the æstivation is variable, even in the same species, but, in general, it supplies a constant character in species, in genera, or even in Natural Orders.

104. In general shape the **Corolla** is

tubular, when the whole or the greater part of it is in the form of a tube or cylinder.

campanulate, when approaching in some measure the shape of a cup or bell.

urceolate, when the tube is swollen or nearly globular, contracted at the top, and slightly expanded again in a narrow rim.

rotate or *stellate*, when the petals or lobes are spread out horizontally from the base, or nearly so, like a wheel or star.

hypocrateriform or *salver-shaped*, when the lower part is cylindrical and the upper portion expanded horizontally. In this case the name of *tube* is restricted to the cylindrical part, and the horizontal portion is called the *limb*, whether it be divided to the base or not. The orifice of the tube is called its *mouth* or *throat*.

infundibuliform or *funnel-shaped*, when the tube is cylindrical at the base, but enlarged at the top into a more or less campanulate limb, of which the lobes often spread horizontally. In this case the campanulate part, up to the commencement of the lobes, is sometimes considered as a portion of the tube, sometimes as a portion of the limb, and by some botanists again described as independent of either, under the name of *throat* (*fauces*). Generally speaking, however, in campanulate, infundibuliform, or other corollas, where the lower entire part passes gradually into the upper divided and more spreading part, the distinction between the *tube* and the *limb* is drawn either at the point where the lobes separate, or at the part where the corolla first expands, according to which is the most marked.

105. Irregular corollas have received various names according to the more familiar forms they have been compared to. Some of the most important are the

bilabiate, or *two-lipped* corolla, when, in a four- or five-lobed corolla, the two or three upper lobes stand obviously apart, like an *upper lip*, from the two or three lower ones or *under lip*. In *Orchideæ* and some other families the name of lip, or *labellum*, is given to one of the divisions or lobes of the perianth.

personate, when two-lipped, and the orifice of the tube closed by a projection from the base of the upper or lower lip, called a *palate*.

ringent, when very widely two-lipped, and the orifice of the tube very open.

spurred, when the tube or the lower part of a petal has a conical hollow projection, compared to the spur of a cock; *saccate*, when the spur is short and round like a little bag; *gibbous*, when projecting at any part into a slight swelling; *foveolate*, when marked in any part with a slight glandular or thickened cavity.

resupinate or *reversed*, when a lip, spur, etc., which in allied species is usually lowest, lies uppermost, and *vice versâ*.

106. The above terms are mostly applied to the forms of monopetalous corollas, but several are also applicable to those of polypetalous ones. Terms descriptive of the special forms of corolla in certain Natural Orders, will be explained under those Orders respectively.

107. Most of the terms used for describing the forms of leaves (39, 45) are also applicable to those of individual petals; but the flat expanded portion of a petal, corresponding to the blade of the leaf, is called its *lamina*, and the stalk, corresponding to the petiole, its *claw* (*unguis*). The stalked petal is said to be *unguiculate*.

§ 10. *The Stamens.*

108. Although in a few cases the outer stamens may gradually pass into petals, yet, in general, **Stamens** are very different in shape and aspect from leaves, sepals or petals. It is only in a theoretical point of view (not the less important in the study of the physiological economy of the plant) that they can be called altered leaves.

109. This usual form is a stalk, called the *filament*, bearing at the top an *anther* divided into two pouches or *cells*. These anther-cells are filled with *pollen*, consisting of minute grains, usually forming a yellow dust, which, when the flower expands, is scattered from an opening in each cell. When the two cells are not closely contiguous, the portion of the anther that unites them is called the *connectivum*.

110. The filament is often wanting, and the anther sessile, yet still the stamen is perfect; but if the anther, which is the essential part of the stamen, is wanting, or

does not contain pollen, the stamen is imperfect, and is then said to be *barren* or *sterile* (without pollen), *abortive*, or *rudimentary* (84), according to the degree to which the imperfection is carried. Imperfect stamens are often called *staminodia*.

111. In unsymmetrical flowers, the stamens of each whorl are sometimes reduced in number below that of the petals, even to a single one, and in several Natural Orders they are multiplied indefinitely.

112. The terms *monandrous* and *polyandrous* are restricted to flowers which have really but one stamen, or an indefinite number respectively. Where several stamens are united into one, the flower is said to be *synandrous*.

113. **Stamens** are

monadelphous, when united by their filaments into one cluster. This cluster either forms a tube round the pistil, or, if the pistil is wanting, occupies the centre of the flower.

diadelphous, when so united into two clusters or *phalanges*. The term is more especially applied to certain *Leguminosæ*, in which nine stamens are united in a tube slit open on the upper side, and a tenth, placed in a slit, is free. In some other plants the stamens are equally distributed in the two clusters.

triadelphous, *pentadelphous*, *polyadelphous*, when so united into three, five, or many clusters or *phalanges*.

syngenesious, when united by their anthers in a ring round the pistil, the filaments usually remaining free.

didynamous, when (usually in a bilabiate flower) there are four stamens in two pairs, those of one pair longer than those of the other.

tetradynamous, when (in *Cruciferæ*) there are six, four of them longer than the two others.

exserted, when longer than the corolla, or even when longer than its tube, if the limb be very spreading.

114. An **Anther** (109) is

adnate, when continuous with the filament, the anther-cells appearing to lie their whole length along the upper part of the filament.

innate, when firmly attached by their base to the filament. This is an adnate anther when rather more distinct from the filament.

versatile, when attached by their back to the very point of the filament, so as to swing loosely.

115. Anther-cells may be *parallel* or *diverging* at a less or greater angle; or *divaricate*, when placed end to end so as to form one straight line. The end of each anther-cell placed nearest to the other cell is generally called its *apex* or *summit*, and the other end its *base* (36); but some botanists reverse the sense of these terms.

116. Anthers have often, on their connectivum or cells, appendages termed *bristles* (setæ), *spurs*, *crests*, *points*, *glands*, etc., according to their appearance.

117. Anthers have occasionally only one cell: this may take place either by the disappearance of the partition between two closely contiguous cells, when these cells are said to be *confluent*; or by the abortion or total deficiency of one of the cells, when the anther is said to be *dimidiate*.

118. Anthers will open or *dehisce* to let out the pollen, like capsules, in *valves*, *pores*, or *slits*. Their dehiscence is *introrse*, when the opening faces the pistil; *extrorse*, when towards the circumference of the flower.

119. Pollen (109) is not always in the form of dust. It is sometimes collected in each cell into one or two little wax-like masses. Special terms used in describing these masses or other modifications of the pollen will be explained under the Orders where they occur.

§ 11. *The Pistil.*

120. The carpels (91) of the **Pistil**, although they may occasionally assume, rather more than stamens, the appearance and colour of leaves, are still more different in shape and structure. They are usually sessile; if stalked, their stalk is called a *podocarp*. This stalk, upon which each separate carpel is supported above the receptacle, must not be confounded with the *gynobasis* (143), upon which the whole pistil is sometimes raised.

121. Each carpel consists of three parts:

1. the **Ovary,** or enlarged base, which includes one or more cavities or *cells*, containing one or more small bodies called *ovules*. These are the earliest condition of the future seeds.

2. the **Style,** proceeding from the summit of the ovary, and supporting—

3. the **Stigma,** which is sometimes a point (or *punctiform* stigma) or small head (a *capitate* stigma) at the top of the style or ovary, sometimes a portion of its surface more or less lateral and variously shaped, distinguished by a looser texture, and covered with minute protuberances called *papillæ*.

122. The style is often wanting, and the stigma is then sessile on the ovary, but in the perfect pistil there is always at least one ovule in the ovary, and some portion of stigmatic surface. Without these the pistil is imperfect, and said to be *barren* (not setting seed), *abortive*, or *rudimentary* (84), according to the degree of imperfection.

123. The ovary being the essential part of the pistil, most of the terms relating to the number, arrangement, etc., of the carpels, apply specially to their ovaries. In some works each separate carpel is called a pistil, all those of a flower constituting together the *gynœcium*; but this term is in little use, and the word *pistil* is more generally applied in a collective sense. When the ovaries are at all united, they are commonly termed collectively a compound ovary.

124. The number of carpels or ovaries in a flower is frequently reduced below that of the parts of the other floral whorls, even in flowers otherwise symmetrical. In a very few genera, however, the ovaries are more numerous than the petals, or indefinite. They are in that case either arranged in a single whorl, or form a head or spike in the centre of the flower.

125. The terms *monogynous*, *digynous*, *polygynous*, etc. (with a pistil of one, two, or more parts), are vaguely used, applying sometimes to the whole pistil, sometimes to the ovaries alone, or to the styles or stigmas only. Where a more precise nomenclature is adopted, the flower is

monocarpellary, when the pistil consists of a single simple carpel.

bi-, *tri-*, etc., to *poly-carpellary*, when the pistil consists of two, three, or an indefinite number of carpels, whether separate or united.

syncarpous, when the carpels or their ovaries are more or less united into one compound ovary.

apocarpous, when the carpels or ovaries are all free and distinct.

126. A *compound* ovary is

unilocular or *one-celled*, when there are no partitions between the ovules, or when these partitions do not meet in the centre so as to divide the cavity into several cells.

plurilocular or *several-celled*, when completely divided into two or more cells by partitions called *dissepiments* (*septa*), usually vertical and radiating from the centre or axis of the ovary to its circumference.

bi-, *tri-*, etc., to *multi-locular*, according to the number of these cells, two, three, etc., or many.

127. In general the number of cells or of dissepiments, complete or partial, or of rows of ovules, corresponds with that of the carpels, of which the pistil is composed. But sometimes each carpel is divided completely or partially into two cells, or has two rows of ovules, so that the number of carpels appears double what it really is. Sometimes again the carpels are so completely combined and reduced as to form a single cell, with a single ovule, although it really consist of several carpels. But in these cases the ovary is usually described as it appears, as well as such as it is theoretically supposed to be.

128. In apocarpous pistils the styles are usually free, each bearing its own stigma. Very rarely the greater part of the styles, or the stigmas alone, are united, whilst the ovaries remain distinct.

129. Syncarpous pistils are said to have

several styles, when the styles are free from the base.

one style, with several branches, when the styles are connected at the base, but separate below the point where the stigmas or stigmatic surfaces commence.

one simple style, with several stigmas, when united up to the point where the stigmas or stigmatic surfaces commence, and then separating.

one simple style, with a branched, lobed, toothed, notched, or entire stigma (as the case may be), when the stigmas also are more or less united. In many works, however, this precise nomenclature is not strictly adhered to, and considerable confusion is often the result.

130. In general the number of styles, or branches of the style or stigma, is the same as that of the carpels, but sometimes that number is doubled, especially in the stigmas, and sometimes the stigmas are dichotomously or pinnately branched, or *penicillate*, that is, divided into a tuft of hair-like branches. All these variations sometimes make it a difficult task to determine the number of carpels forming a compound ovary, but the point is of considerable importance in fixing the affinities of plants, and, by careful consideration, the real as well as the apparent number has now in most cases been agreed upon.

131. The *Placenta* is the part of the inside of the ovary to which the ovules are attached, sometimes a mere point or line on the inner surface, often more or less thickened or raised. *Placentation* is therefore the indication of the part of the ovary to which the ovules are attached.

132. Placentas are

axile, when the ovules are attached to the axis or centre, that is, in plurilocular ovaries, when they are attached to the inner angle of each cell; in unilocular simple ovaries, which have almost always an excentrical style or stigma, when the ovules are attached to the side of the ovary nearest to the style; in unilocular compound ovaries, when the ovules are attached to a central protuberance, column, or axis rising up from the base of the cavity. If this column does not reach the top of the cavity, the placenta is said to be *free* and *central*.

parietal, when the ovules are attached to the inner surface of the cavity of a one-celled compound ovary. Parietal placentas are usually slightly thickened or raised lines, sometimes broad surfaces nearly covering the inner surface of the cavity, sometimes projecting far into the cavity, and constituting partial dissepiments, or even meeting in the centre, but without cohering there. In the latter case the distinction between the one-celled and the several-celled ovary sometimes almost disappears.

133. Each **Ovule** (121), when fully formed, usually consists of a central mass or *nucleus* enclosed in two bag-like *coats*, the outer one called *primine*, the inner one *secundine*. The *chalaza* is the point of the ovule at which the base of the nucleus is confluent with the coats. The *foramen* is a minute aperture in the coats over the *apex* of the nucleus.

134. **Ovules** are

orthotropous or *straight*, when the chalaza coincides with the base (36) of the ovule, and the foramen is at the opposite extremity, the axis of the ovule being straight.

campylotropous or *incurved*, when the chalaza still coinciding with the base of the ovule, the axis of the ovule is curved, bringing the foramen down more or less towards that base.

anatropous or *inverted*, when the chalaza is at the apex of the ovule, and the foramen next to its base, the axis remaining straight. In this, one of the most frequent forms of the ovule, the chalaza is connected with the base by a cord, called the *rhaphe*, adhering to one side of the ovule, and becoming more or less incorporated with its coats, as the ovule enlarges into a seed.

amphitropous or *half-inverted*, when the ovule being as it were attached laterally, the chalaza and foramen at opposite ends of its straight or curved axis are about equally distant from the base or point of attachment.

§ 12. *The Receptacle and Relative Attachment of the Floral Whorls.*

135. The **Receptacle** or *torus* is the extremity of the peduncle (above the calyx), upon which the corolla, stamens, and ovary are inserted. It is sometimes little more than a mere point or minute hemisphere, but it is often also more or less elongated, thickened, or otherwise enlarged. It must not be confounded with the receptacle of inflorescence (74).

136. A *Disk*, or *disc*, is a circular enlargement of the receptacle, usually in the form of a cup (*cupular*), of a flat disk or quoit, or of a cushion (*pulvinate*). It is either immediately at the base of the ovary within the stamens, or between the petals and stamens, or bears the petals or stamens or both on its margin, or is quite at the extremity of the receptacle, with the ovaries arranged in a ring round it or under it.

137. The disk may be *entire*, or *toothed* or *lobed*, or *divided* into a number of parts, usually equal to or twice that of the stamens or carpels. When the parts of the disk are quite separate and short, they are often called *glands*.

138. *Nectaries* are either the disk, or small deformed petals, or abortive stamens, or appendages at the base of petals, or stamens, or any small bodies within the flower which do not look like petals, stamens, or ovaries. They were formerly supposed to supply bees with their honey, and the term is frequently to be met with in the older Floras, but is now deservedly going out of use.

139. When the disk bears the petals and stamens, it is frequently adherent to, and apparently forms part of, the tube of the calyx, or it is adherent to, and apparently forms part of, the ovary, or of both calyx-tube and ovary. Hence the three following important distinctions in the relative insertion of the floral whorls.

140. *Petals*, or as it is frequently expressed, flowers, are

hypogynous (*i. e.* under the ovary), when they or the disk that bears them are entirely free both from the calyx and ovary. The ovary is then described as *free* or *superior*, the calyx as *free* or *inferior*, the petals as being *inserted on the receptacle.*

perigynous (*i. e.* round the ovary), when the disk bearing the petals is quite free from the ovary, but is more or less combined with the base of the calyx-tube. The ovary is then still described as *free* or *superior*, even though the combined disk and calyx-tube may form a deep cup with the ovary lying in the bottom; the calyx *is* said to be *free* or *inferior*, and the petals are described as *inserted on the calyx.*

epigynous (*i. e.* upon the ovary), when the disk bearing the petals is combined both with the base of the calyx-tube and the base outside of the ovary; either closing over the ovary so as only to leave a passage for the style, or leaving more or less of the top of the ovary free, but always adhering to it above the level of the insertion of the lowest ovule (except in a very few cases where the ovules are absolutely suspended from the top of the cell). In epigynous flowers the ovary is described as *adherent* or *inferior*, the calyx as *adherent* or *superior*, the petals as *inserted on* or *above the ovary.* In some works, however, most epigynous flowers are included in the perigynous ones, and a very different meaning is given to the term *epigynous* (144), and there are a few cases where no positive distinction can be drawn between the epigynous and perigynous flowers, or again between the perigynous and hypogynous flowers.

141. When there are no petals, it is the insertion of the stamens that determines the difference between the hypogynous, perigynous, and epigynous flowers.

142. When there are both petals and stamens,

in hypogynous flowers, the petals and stamens are usually free from each other, but sometimes they are combined at the base. In that case, if the petals are distinct from each other, and the stamens are monadelphous, the petals are often said to be *inserted on* or *combined with the staminal tube*; if the corolla is gamopetalous and the stamens distinct from each other, the latter are said to be *inserted in the tube of the corolla.*

in perigynous flowers, the stamens are usually inserted immediately within the petals, or alternating with them on the edge of the disk, but occasionally much lower down within the disk, or even on the unenlarged part of the receptacle.

in epigynous flowers, when the petals are distinct, the stamens are usually inserted as in perigynous flowers; when the corolla is gamopetalous, the stamens are either free and epigynous, or combined at the base with (inserted in) the tube of the corolla.

143. When the receptacle is distinctly elongated below the ovary, it is often called a *gynobasis*, *gynophore*, or *stalk of the ovary.* If the elongation takes place below the stamens or below the petals, these stamens or petals are then said to be *inserted on the stalk of the ovary*, and are occasionally, but falsely, described as *epigynous.* Really epigynous stamens (*i. e.* when the filaments are combined with the ovary) are very rare, unless the rest of the flower is epigynous.

144. An *epigynous disk* is a name given either to the thickened summit of the ovary in epigynous flowers, or very rarely to a real disk or enlargement of the receptacle closing over the ovary.

145. In the relative position of any two or more parts of the flower, whether in the same or in different whorls, they are

connivent, when nearer together at the summit than at the base.

divergent, when further apart at the summit than at the base.

coherent, when united together, but so slightly that they can be separated with little or no laceration; and one of the two coherent parts (usually the smallest or least important) is said to be *adherent* to the other. Grammatically speaking, these two terms convey nearly the same meaning, but require a different form of phrase; practically however it has been found more convenient to restrict *cohesion* to the union of parts of the same whorl, and *adhesion* to the union of parts of different whorls.

connate, when so closely united that they cannot be separated without laceration. Each of the two connate parts, and especially that one which is considered the smaller or of the least importance, is said to be *adnate* to the other.

free, when neither coherent nor connate.

distinct is also used in the same sense, but is also applied to parts distinctly visible or distinctly limited.

§ 13. *The Fruit.*

146. The **Fruit** (15) consists of the ovary and whatever other parts of the flower are *persistent* (*i. e.* persist at the time the seed is ripe), usually enlarged, and more or less altered in shape and consistence. It encloses or covers the seed or seeds till the period of maturity, when it either opens for the seed to escape, or falls to the ground with the seed. When stalked, its stalk has been termed a *carpophore*.

147. Fruits are, in elementary works, said to be *simple* when the result of a single flower, *compound* when they proceed from several flowers closely packed or combined in a head. But as a fruit resulting from a single flower, with several distinct carpels, is compound in the sense in which that term is applied to the ovary, the terms *single* and *aggregate*, proposed for the fruit resulting from one or several flowers, may be more appropriately adopted. In descriptive botany a fruit is always supposed to result from a single flower unless the contrary be stated. It may, like the pistil, be syncarpous or apocarpous (125); and as in many cases carpels united in the flower may become separate as they ripen, an apocarpous fruit may result from a syncarpous pistil.

148. The involucre or bracts often persist and form part of aggregate fruits, but very seldom so in single ones.

149. The receptacle becomes occasionally enlarged and succulent; if when ripe it falls off with the fruit, it is considered as forming part of it.

150. The adherent part of the calyx of epigynous flowers always persists and forms part of the fruit; the free part of the calyx of epigynous flowers or the calyx of perigynous flowers, either persists entirely at the top of or round the fruit, or the lobes alone fall off, or the lobes fall off with whatever part of the calyx is above the insertion of the petals, or the whole of what is free from the ovary falls off, including the disk bearing the petals. The calyx of hypogynous flowers usually falls off entirely or persists entirely. In general a calyx is called deciduous if any part falls off. When it persists it is either enlarged round or under the fruit, or it withers and dries up.

151. The corolla usually falls off entirely; when it persists it is usually withered and dry (*marcescent*), or very seldom enlarges round the fruit.

152. The stamens either fall off, or more or less of their filaments persists, usually withered and dry.

153. The style sometimes falls off or dries up and disappears; sometimes persists, forming a point to the fruit, or becomes enlarged into a wing or other appendage to the fruit.

154. The *Pericarp* is the portion of the fruit formed of the ovary, and whatever adheres to it exclusive of and outside of the seed or seeds, exclusive also of the persistent

receptacle, or of whatever portion of the calyx persists round the ovary without adhering to it.

155. Fruits have often external appendages called *wings* (alæ), *beaks*, *crests*, *awns*, etc., according to their appearance. They are either formed by persistent parts of the flower more or less altered, or grow out of the ovary or the persistent part of the calyx. If the appendage be a ring of hairs or scales round the top of the fruit, it is called a *pappus*.

156. Fruits are generally divided into *succulent* (including *fleshy*, *pulpy*, and *juicy* fruits) and *dry*. They are *dehiscent* when they open at maturity to let out the seeds, *indehiscent* when they do not open spontaneously but fall off with the seeds. Succulent fruits are usually indehiscent.

157. The principal kinds of succulent fruits are

the *Berry*, in which the whole substance of the pericarp is fleshy or pulpy, with the exception of the outer skin or rind, called the *Epicarp*. The seeds themselves are usually immersed in the pulp; but in some berries, the seeds are separated from the pulp by the walls of the cavity or cells of the ovary, which form as it were a thin inner skin or rind, called the *Endocarp*.

the *Drupe*, in which the pericarp, when ripe, consists of two distinct portions, an outer succulent one called the *Sarcocarp*, or *Mesocarp* (covered like the berry by a skin or epicarp), and an inner dry endocarp called the *Putamen*, which is either *cartilaginous* (of the consistence of parchment) or hard and woody. In the latter case it is commonly a *stone*, and the drupe a *stone-fruit*. When the putamen consists of several distinct stones or nuts, each enclosing a seed, they are called *pyrenes*, or sometimes *kernels*.

158. The principal kinds of dry fruits are

the *Capsule* or *Pod*,* which is dehiscent. When ripe the pericarp usually splits longitudinally into as many or twice as many pieces, called *valves*, as it contains cells or placentas. If these valves separate at the line of junction of the carpels, that is, along the line of the placentas or dissepiments, either splitting them or leaving them attached to the axis, the dehiscence is termed *septicidal*; if the valves separate between the placentas or dissepiment, the dehiscence is *loculicidal*, and the valves either bear the placentas or dissepiments along their middle line, or leave them attached to the axis. Sometimes also the capsule discharges its seeds by *slits*, *chinks*, or *pores*, more or less regularly arranged, or bursts irregularly, or separates into two parts by a horizontal line; in the latter case it is said to be *circumsciss*.

the *Nut* or *Achene*, which is indehiscent and contains but a single seed. When the pericarp is thin in proportion to the seed it encloses, the whole fruit (or each of its lobes) has the appearance of a single seed, and is so called in popular language. If the pericarp is thin and rather loose, it is often called a *Utricle*. A *Samara* is a nut with a wing at its upper end.

159. Where the carpels of the ovary are distinct (125) they may severally become as many distinct berries, drupes, capsules, or achenes. Separate carpels are usually more or less compressed laterally, with more or less prominent inner and outer edges, called *sutures*, and, if dehiscent, the carpel usually opens at these sutures. A *Follicle* is a carpel opening at the inner suture only. In some cases where the carpels are united in the ovary they will separate when ripe; they are then called *Cocci* if one-seeded.

160. The peculiar fruits of some of the large Orders have received special names, which will be explained under each Order. Such are the *siliqua* and *silicule* of Cruciferæ, the *legume* of Leguminosæ, the *pome* of *Pyrus* and its allies, the *pepo* of Cucurbitaceæ, the *cone* of Coniferæ, the *grain* or *caryopsis* of Gramineæ, etc.

§ 14. *The Seed.*

161. The **Seed** is enclosed in the pericarp in the great majority of flowering plants, called therefore *Angiosperms*, or *angiospermous plants*. In *Coniferæ* and a very few

* In English descriptions, *pod* is more frequently used when it is long and narrow; *capsule*, or sometimes *pouch*, when it is short and thick or broad.

allied genera, called *Gymnosperms*, or *gymnospermous plants*, the seed is naked, without any real pericarp. These truly gymnospermous plants must not be confounded with *Labiatæ*, *Borragineæ*, etc., which have also been falsely called gymnospermous, their small nuts having the appearance of seeds (158).

162. The seed when ripe contains an *embryo* or young plant, either filling or nearly filling the cavity, but not attached to the outer skin or the seed, or more or less immersed in a mealy, oily, fleshy, or horn-like substance, called the *albumen*, or *perisperm*. The presence or absence of this albumen, that is, the distinction between *albuminous* and *exalbuminous* seeds, is one of great importance. The embryo or albumen can often only be found or distinguished when the seed is quite ripe, or sometimes only when it begins to germinate.

163. The shell of the seed consists usually of two separable *coats*. The outer coat, called the *testa*, is usually the principal one, and in most cases the only one attended to in descriptions. It may be hard and *crustaceous*, woody or bony, or thin and *membranous* (skin-like), dry, or rarely succulent. It is sometimes expanded into *wings*, or bears a tuft of hair, cotton, or wool, called a *coma*. The inner coat is called the *tegmen*.

164. The *funicle* is the stalk by which the seed is attached to the placenta. It is occasionally enlarged into a membranous, pulpy, or fleshy appendage, sometimes spreading over a considerable part of the seed, or nearly enclosing it, called an *aril*. A *strophiole* or *caruncle* is a similar appendage proceeding from the testa by the side of or near the funicle.

165. The *hilum* is the scar left on the seed where it separates from the funicle. The *micropyle* is a mark indicating the position of the foramen of the ovule (133).

166. The **Embryo** (162) consists of the *Radicle* or base of the future root, one or two *Cotyledons* or future seed-leaves, and the *Plumule* or future bud within the base of the cotyledons. In some seeds, especially where there is no albumen, these several parts are very conspicuous, in others they are very difficult to distinguish until the seed begins to germinate. Their observation, however, is of the greatest importance, for it is chiefly upon the distinction between the embryo with one or with two cotyledons that are founded the two great classes of phænogamous plants, *Monocotyledons* and *Dicotyledons*. Cotyledons are said to be *conduplicate* when folded once lengthwise; *contortuplicate* when variously folded or twisted; *conferruminate* when so united that no line of separation can be traced.

167. Although the embryo lies loose (unattached) within the seed, it is generally in some determinate position with respect to the seed or to the whole fruit. This position is described by stating the direction of the radicle next to or more or less remote from the *hilum*, or it is said to be *superior* if pointing towards the summit of the *fruit*, *inferior* if pointing towards the base of the *fruit*.

§ 15. *Accessory Organs.*

168. Under this name are included, in many elementary works, various external parts of plants which do not appear to act any essential part either in the vegetation or reproduction of the plant. They may be classed under four heads: *Tendrils* and *Hooks*, *Thorns* and *Prickles*, *Hairs* and *Glands*.

169. **Tendrils** (*cirrhi*) are usually abortive petioles, or abortive peduncles, or sometimes abortive ends of branches. They are simple or more or less branched, flexible, and coil more or less firmly round any objects within their reach, in order to support the plant to which they belong. *Hooks* are similar holdfasts, but of a firmer consistence, not branched, and less coiled.

170. **Thorns** and **Prickles** have been fancifully called the weapons of plants. A *Thorn* or *Spine* is the strongly pointed extremity of a branch, or abortive petiole, or abortive peduncle. A *Prickle* is a sharply pointed excrescence from the epidermis, and is usually produced on a branch, on the petiole or veins of a leaf, or on a peduncle, or even on the calyx or corolla. When the teeth of a leaf or the stipules are pungent, they are also called *prickles*, not *thorns*. A plant is *spinous* if it has thorns, *aculeate* if it has prickles.

171. **Hairs,** in the general sense, or the *indumentum* (or clothing) of a plant, include all those productions of the epidermis which have, by a more or less appropriate comparison, been termed *bristles*, *hairs*, *down*, *cotton*, or *wool*.

172. Hairs are often branched. They are said to be *attached by the centre*, if parted from the base, and the forks spread along the surface in opposite directions; *plumose*, if the branches are arranged along a common axis, as in a feather; *stellate*, if several branches radiate horizontally. These stellate hairs have sometimes their rays connected together at the base, forming little flat circular disks attached by the centre, and are then called *scales*, and the surface is said to be *scaly* or *lepidote*.

173. The *Epidermis*, or outer skin, of an organ, as to its surface and indumentum, is

smooth, when without any protuberance whatever.

glabrous, when without hairs of any kind.

glabrescent, *glabrate*, becoming glabrous.

striate, when marked with parallel longitudinal lines, either slightly raised or merely discoloured.

furrowed (*sulcate*) or *ribbed* (*costate*) when the parallel lines are more distinctly raised.

rugose, when wrinkled or marked with irregular raised or depressed lines.

umbilicate, when marked with a small round depression.

umbonate, when bearing a small boss like that of a shield.

viscous, *viscid*, or *glutinous*, when covered with a sticky or clammy exudation.

scabrous, when rough to the touch.

tuberculate or *warted*, when covered with small, obtuse, wart-like protuberances.

muricate, when the protuberances are more raised and pointed but yet short and hard.

echinate, when the protuberances are longer and sharper, almost prickly.

setose or *bristly*, when bearing very stiff erect straight hairs.

glandular-setose, when the setæ or bristles terminate in a minute resinous head or drop. In some works, especially in the case of Roses and *Rubus*, the meaning of *setæ* has been restricted to such as are glandular.

glochidiate, when the setæ are hooked at the top.

pilose, when the surface is thinly sprinkled with rather long simple hairs.

hispid, when more thickly covered with rather stiff hairs.

hirsute, when the hairs are dense and not so stiff.

downy or *pubescent*, when the hairs are short and soft; *puberulent*, when slightly pubescent.

strigose, when the hairs are rather short and stiff, and lie close along the surface all in the same direction; *strigillose*, when slightly strigose.

tomentose or *cottony*, when the hairs are very short and soft, rather dense and more or less intricate, and usually white or whitish.

woolly (*lanate*), when the hairs are long and loosely intricate, like wool. The wool or tomentum is said to be *floccose* when closely intricate and readily detached, like fleece.

mealy (*farinose*), when the hairs are excessively short, intricate and white, and come off readily, having the appearance of meal or dust.

canescent or *hoary*, when the hairs are so short as not readily to be distinguished by the naked eye, and yet give a general whitish hue to the epidermis.

glaucous, when of a pale bluish-green, often covered with a fine bloom.

glaucescent, subglaucous or becoming glaucous.

174. The meanings here attached to the above terms are such as appear to have been most generally adopted, but there is much vagueness in the use practically made of many of them by different botanists. This is especially the case with the terms *pilose*, *hispid*, *hirsute*, *pubescent*, and *tomentose*.

175. The name of **Glands** is given to several different productions, and principally to the four following:—

1. Small wart-like or shield-like bodies, either sessile or sometimes stalked, of a fungous or somewhat fleshy consistence, occasionally secreting a small quantity of oily

or resinous matter, but more frequently dry. They are generally few in number, often definite in their position and form, and occur chiefly on the petiole or principal veins of leaves, on the branches of inflorescences, or on the stalks or principal veins of bracts, sepals, or petals.

2. Minute raised dots, usually black, red, or dark-coloured, of a resinous or oily nature, always superficial, and apparently exudations from the epidermis. They are often numerous on leaves, bracts, sepals, and green branches, and occur even on petals and stamens, more rarely on pistils. When raised upon slender stalks they are called *pedicellate* (or *stipitate*) *glands*, or *glandular hairs*, according to the thickness of the stalk.

3. Small, globular, oblong or even linear vesicles, filled with oil, imbedded in the substance itself of leaves, bracts, floral organs, or fruits. They are often very numerous, like transparent dots, sometimes few and determinate in form and position. In the pericarp of *Umbelliferæ* they are remarkably regular and conspicuous, and take the name of *vittæ*.

4. *Lobes* of the disk (137), or other small fleshy excrescences within the flower, whether from the receptacle, calyx, corolla, stamens, or pistil.

Chap. II. Classification, or Systematic Botany.

176. It has already been observed (3) that descriptions of plants should, as nearly as possible, be arranged under natural divisions, so as to facilitate the comparison of each plant with those most nearly allied to it. The descriptions of plants here alluded to are descriptions of *species*; the natural divisions of the Flora refer to natural *groups of species*.

177. A **Species** comprises all the individual plants which resemble each other sufficiently to make us conclude that they are all, or *may have been* all, descended from a common parent. These individuals may often differ from each other in many striking particulars, such as the colour of the flower, size of the leaf, etc., but these particulars are such as experience teaches us are liable to vary in the seedlings raised from one individual.

178. When a large number of the individuals of a species differ from the others in any striking particular they constitute a **Variety.** If the variety generally comes true from seed, it is often called a *Race*.

179. A *Variety* can only be propagated with certainty by grafts, cuttings, bulbs, tubers, or any other method which produces a new plant by the development of one or more buds taken from the old one. A *Race* may with care be propagated by seed, although seedlings will always be liable, under certain circumstances, to lose those particulars which distinguish it from the rest of the species. A real *Species* will always come true from seed.

180. The known species of plants (now near 100,000) are far too numerous for the human mind to study without classification, or even to give distinct single names to. To facilitate these objects, an admirable system, invented by Linnæus, has been universally adopted, viz. one common substantive name is given to a number of species which resemble each other more than they do any other species; the species so collected under one name are collectively called a **Genus,** the common name being the *generic* name. Each species is then distinguished from the others of the same genus by the addition of an adjective epithet or *specific name*. Every species has thus a botanical name of two words. In Latin, the language usually used for the purpose, the first word is a substantive and designates the genus; the second, an adjective, indicates the species.

181. The genera thus formed being still too numerous (above 6000) for study without further arrangement, they have been classed upon the same principles, viz. genera which resemble each other more than they do any other genera, have been collected

together into groups of a higher degree called **Families** or **Natural Orders**, to each of which a common name has been given. This name is in Latin an adjective plural, usually taken from the name of some one *typical* genus, generally the best known, the first discovered, or the most marked (e. g. *Ranunculaceæ* from *Ranunculus*). This is however for the purpose of study and comparison. To speak of a species, to refer to it and identify it, all that is necessary is to give the generic and specific names.

182. Natural Orders themselves (of which we reckon near 200) are often in the same manner collected into **Classes**; and where Orders contain a large number of genera, or genera a large number of species, they require further classification. The genera of an Order are then collected into minor groups called *Tribes*, the species of a genus into *Sections*, and in a few cases this intermediate classification is carried still further. The names of these several groups the most generally adopted are as follows, beginning with the most comprehensive or highest:—

Classes.	Genera.
Subclasses or *Alliances*.	*Subgenera*.
Natural Orders or Families.	Sections.
Suborders.	*Subsections*.
Tribes.	Species.
Subtribes.	Varieties.
Divisions.	
Subdivisions.	

183. The characters (3) by which a species is distinguished from all other species of the same genus are collectively called the *specific character* of the plant; those by which its genus is distinguished from other genera of the Order, or its Order from other Orders, are respectively called the *generic* or *ordinal* character, as the case may be. The *habit* of a plant, of a species, a genus, etc., consists of such general characters as strike the eye at first sight, such as size, colour, ramification, arrangement of the leaves, inflorescence, etc., and are chiefly derived from the organs of vegetation.

184. Classes, Orders, Genera, and their several subdivisons, are called *natural* when, in forming them, all resemblances and differences are taken into account, valuing them according to their evident or presumed importance; *artificial*, when resemblances and differences in some one or very few particulars only are taken into account independently of all others.

185. The number of species included in a genus, or the number of genera in an Order, is very variable. Sometimes two or three or even a single species may be so different from all others as to constitute the entire genus: in others, several hundred species may resemble each other so much as to be all included in one genus; and there is the same discrepancy in the number of genera to a Family. There is moreover, unfortunately, in a number of instances, great difference of opinion as to whether certain plants differing from each other in certain particulars are varieties of one species or belong to distinct species; and again, whether two or more groups of species should constitute as many sections of one genus, or distinct genera, or tribes of one Order, or even distinct Natural Orders. In the former case, as a species is supposed to have a real existence in nature, the question is susceptible of argument, and sometimes of absolute proof. But the place a group should occupy in the scale of degree is very arbitrary, being often a mere question of convenience. The more subdivisions upon correct principles are multiplied, the more they facilitate the study of plants, provided always the main resting-points for constant use, the Order and the Genus, are comprehensive and distinct. But if every group into which a genus can be divided be erected into a distinct genus, with a substantive name to be remembered whenever a species is spoken of, all the advantages derived from the beautiful simplicity of the Linnæan nomenclature are gone.

Chap. III. Vegetable Anatomy and Physiology.

§ 1. *Structure and Growth of the Elementary Tissues.*

186. If a very thin slice of any part of a plant be placed under a microscope of high magnifying power, it will be found to be made up of variously shaped and arranged ultimate parts, forming a sort of honeycombed structure. These ultimate parts are called *cells*, and form by their combination the *elementary tissues* of which the entire plant is composed.

187. A cell in its simplest state is a closed membranous sac, formed of a substance permeable by fluids, though usually destitute of visible pores. Each cell is a distinct individual, separately formed and separately acting, though cohering with the cells with which it is in contact, and partaking of the common life and action of the tissue of which it forms a part. The membranes separating or enclosing the cells are also called their *walls*.

188. Botanists usually distinguish the following tissues:—

(1) *Cellular tissue*, or *parenchyma*, consists usually of thin-walled cells, more or less round in form, or with their length not much exceeding their breadth, and not tapering at the ends. All the soft parts of the leaves, the pith of stems, the pulp of fruits, and all young growing parts, are formed of it. It is the first tissue produced, and continues to be formed while growth continues, and when it ceases to be active the plant dies.

(2) *Woody tissue*, or *prosenchyma*, differs in having its cells considerably longer than broad, usually tapering at each end into points and overlapping each other. The cells are commonly thick-walled; the tissue is firm, tenacious, and elastic, and constitutes the principal part of wood, of the inner bark, and of the nerves and veins of leaves, forming, in short, the framework of the plant.

(3) *Vascular tissue*, or the *vessels* or *ducts* of plants, so called from the mistaken notion that their functions are analogous to those of the vessels (veins and arteries) of animals. A *vessel* in plants consists of a vertical row of cells, which have their transverse partition-walls obliterated, so as to form a continuous tube. All phænogamous plants, as well as ferns and a few other cryptogamous plants, have vessels, and are therefore called *vascular plants*; so the majority of cryptogams having only cellular tissue are termed *cellular plants*. Vessels have their sides very variously marked; some, called *spiral vessels*, have a spiral fibre coiled up their inside, which unrolls when the vessel is broken; others are marked with longitudinal slits, cross bars, minute dots or pits, or with transverse rings. The size of vessels is also very variable in different plants; in some they are of considerable size and visible to the naked eye in cross sections of the stem, in others they are almost absent or can only be traced under a strong magnifier.

189. Various modifications of the above tissues are distinguished by vegetable anatomists under names which need not be enumerated here as not being in general practical use. *Air-vessels*, *cysts*, *turpentine-vessels*, *oil-reservoirs*, etc., are either cavities left between the cells, or large cells filled with peculiar secretions.

190. When tissues are once formed, they increase, not by the general enlargement of the whole of the cells already formed, but by *cell-division*, that is, by the division of young and vitally active cells, and the enlargement of their portions. In the formation of the embryo, the first cell of the new plant is formed, not by division, but around a segregate portion of the contents of a previously existing cell, the embryo-sac. This is termed *free cell-formation*, in contradistinction to cell-division.

191. A young and vitally active cell consists of the *outer wall*, formed of a more or less transparent substance called *cellulose*, permeable by fluids, and of ternary chemical composition (carbon, hydrogen, and oxygen); and of the *cell-contents*, usually viscid or mucilaginous, consisting of *protoplasm*, a substance of quaternary chemical composition (carbon, hydrogen, oxygen, and nitrogen), which fills an important part in cell-division and growth. Within the cell (either in the centre or excentrical) is usually a minute, soft, subgelatinous body called the *nucleus*, whose functions appear to be inti-

mately connected with the first formation of the new cell, As this cell increases in size and its walls in thickness, the protoplasm and watery cell-sap become absorbed or dried up, the firm cellulose wall alone remaining as a permanent fabric, either empty or filled with various organized substances produced or secreted within it.

192. The principal organized contents of cells are

sap, the first product of the digestion of the food of plants; it contains the elements of vegetable growth in a dissolved condition.

sugar, of which there are two kinds, called *cane-sugar* and *grape-sugar*. It usually exists dissolved in the sap. It is found abundantly in growing parts, in fruits, and in germinating seeds.

dextrine, or vegetable mucilage, a gummy substance, between mucilage and starch.

starch or *fecula*, one of the most universal and conspicuous of cell-contents, and often so abundant in farinaceous roots and seeds as to fill the cell-cavity. It consists of minute grains called *starch-granules*, which vary in size and are marked with more or less conspicuous concentric lines. The chemical constitution of starch is the same as that of cellulose; it is unaffected by cold water, but forms a jelly with boiling water, and turns blue when tested by iodine.

chlorophyll, very minute granules, containing nitrogen, and coloured green under the action of sunlight. These granules are most abundant in the layers of cells immediately below the surface or epidermis of leaves and young bark. The green colouring-matter is soluble in alcohol, and may thus be removed from the granules.

chromule, a name given to a similar colouring-matter when green.

wax, *oils*, *camphor*, and *resinous* matter, are common in cells or in cavities in the tissues between the cells, also various mineral substances, either in an amorphous state or as microscopic crystals, when they are called *Raphides*.

§ 2. *Arrangement of the Elementary Tissues, or Structure of the Organs of Plants.*

193. Leaves, young stems, and branches, and most parts of phænogamous plants, during the first year of their existence consist anatomically of

1, a *cellular system*, or continuous mass of cellular tissue, which is developed both vertically as the stem or other parts increase in length, and horizontally or laterally as they increase in thickness or breadth. It surrounds or is intermixed with the fibro-vascular system, or it may exist alone in some parts of phænogamous plants, as well as in cryptogamous ones.

2, a *fibro-vascular system*, or continuous mass of woody and vascular tissue, which is gradually introduced vertically into, and serves to bind together, the cellular system. It is continued from the stem into the petioles and veins of the leaves, and into the pedicels and parts of the flowers, and is never wholly wanting in any phænogamous plant.

3, an *epidermis*, or outer skin, formed of one or more layers of flattened (horizontal), firmly coherent, and usually empty cells, with either thin and transparent or thick and opaque walls. It covers almost all parts of plants exposed to the outward air, protecting their tissues from its immediate action, but is wanting in those parts of aquatic plants which are constantly submerged.

194. The epidermis is frequently pierced by minute spaces between the cells, called *Stomates*. They are oval or mouth-shaped, bordered by *lips*, formed of two or more elastic cells so disposed as to cause the stomate to open in a moist, and to close up in a dry state of the atmosphere. They communicate with intercellular cavities, and are obviously designed to regulate evaporation and respiration. They are chiefly found upon leaves, especially on the under surface.

195. When a phænogamous plant has outlived the first season of its growth, the anatomical structure of its stem or other perennial parts becomes more complicated and very different in the two great classes of phænogamous plants called *Exogens* and *Endogens*, which correspond with very few exceptions to the two classes Dicotyledons and Monocotyledons (167), founded on the structure of the embryo. In Exogens (Dicotyledons) the woody system is placed in concentric layers between a central

pith (198, 1), and an external separable *bark* (198, 5). In Endogens (Monocotyledons) the woody system is in separate small bundles or fibres running through the cellular system without apparent order, and there is usually no distinct central pith, nor outer separable bark.

196. The anatomical structure is also somewhat different in the different organs of plants. In the **Root,** although it is constructed generally on the same plan as the stem, yet the regular organization, and the difference between Exogens and Endogens, is often disguised or obliterated by irregularities of growth, or by the production of large quantities of cellular tissue filled with starch or other substances (192). There is seldom, if ever, any distinct pith, the concentric circles of fibro-vascular tissue in Exogens are often very indistinct or have no relation to seasons of growth, and the epidermis has no stomates.

197. In the **Stem** or branches, during the first year or season of their growth, the difference between Exogens and Endogens is not always very conspicuous. In both there is a tendency to a circular arrangement of the fibro-vascular sytem, leaving the centre either vacant or filled with cellular tissue (pith) only, and a more or less distinct outer rind is observable even in several Endogens. More frequently, however, the distinction is already very apparent the first season, especially towards its close. The fibro-vascular bundles in Endogens usually anastomose but little, passing continuously into the branches and leaves. In Exogens the circle of fibro-vascular bundles forms a more continuous cylinder of network emitting lateral offsets into the branches and leaves.

198. The Exogenous stem, after the first year of its growth, consists of

1, the *pith*, a cylinder of cellular tissue, occupying the centre or longitudinal axis of the stem. It is active only in young stems or branches, becomes dried up and compressed as the wood hardens, and often finally disappears, or is scarcely distinguishable in old trees.

2, the *medullary sheath*, which surrounds and encases the pith. It abounds in spiral vessels (188, 3), and is in direct connection when young, with the leaf-buds and branches, with the petioles and veins of leaves, and other ramifications of the system. Like the pith, it gradually disappears in old wood.

3, the *wood*, which lies immediately outside the medullary sheath. It is formed of woody tissue (188, 2), through which, in most cases, vessels (188, 3) variously disposed are interspersed. It is arranged in annual concentric circles (211), which usually remain active during several years, but in older stems the central and older layers become hard, dense, comparatively inactive, and usually deeper coloured, forming what is called *heart-wood* or *duramen*, the outer, younger, and usually paler-coloured living layers constituting the *sapwood* or *alburnum*.

4, the *medullary rays*, which form vertical plates, originating in the pith, and, radiating from thence, traverse the wood and terminate in the bark. They are formed of cellular tissue, keeping up a communication between the living portion of the centre of the stem and its outer surface. As the heart-wood is formed, the inner portion of the medullary rays ceases to be active, but they usually may still be seen in old wood, forming what carpenters call the *silver grain*.

5, the *bark*, which lies outside the wood, within the epidermis. It is, like the wood, arranged in annual concentric circles (211), of which the outer older ones become dry and hard, forming the *corky layer* or *outer bark*, which, as it is distended by the thickening of the stem, either cracks or is cast off with the epidermis, which is no longer distinguishable. Within the corky layer is the *cellular*, or *green*, or *middle bark*, formed of loose thin-walled pulpy cells containing chlorophyll (192); and which is usually the layer of the preceding season. The innermost and youngest circle, next the young wood, is the *liber* or *inner bark*, formed of long tough woody tissue called *bast-cells*.

199. The Endogenous stem, as it grows old, is not marked by the concentric circles of Exogens. The wood consists of a *matrix* of cellular tissue irregularly traversed by vertical cords or bundles of woody and vascular tissue, which are in connection with the leaves. These vascular bundles change in structure and direction as they pass down the stem, losing their vessels, they retain only their bast- or long wood-cells,

usually curving outwards towards the rind. The old wood becomes more compact and harder towards the circumference than in the centre. The epidermis or rind either hardens so as to prevent any increase of diameter in the stem, or it distends, without increasing in thickness or splitting or casting off any outer layers.

200. In the **Leaf**, the structure of the petioles and principal ribs or veins is the same as that of the young branches of which they are ramifications. In the expanded portion of the leaf the fibro-vascular system becomes usually very much ramified, forming the smaller veins. These are surrounded and the interstices filled up by a copious and very active cellular tissue. The majority of leaves are horizontal, having a differently constructed upper and under surface. The cellular stratum forming the upper surface consists of closely set cells, placed vertically, with their smallest ends next the surface, and with few or no stomates in the epidermis. In the stratum forming the under surface, the cells are more or less horizontal, more loosely placed, and have generally empty spaces between them, with stomates in the epidermis communicating with these intercellular spaces. In vertical leaves (as in a large number of Australian plants) the two surfaces are nearly similar in structure.

201. When leaves are reduced to scales, acting only as protectors of young buds, or without taking any apparent part in the economy of vegetable life, their structure, though still on the same plan, is more simple; their fibro-vascular system is less ramified, their cellular system more uniform, and there are few or no stomates.

202. Bracts and floral envelopes, when green and much developed, resemble leaves in their anatomical structure, but in proportion as they are reduced to scales or transformed into petals, they lose their stomates, and their systems, both fibro-vascular and cellular, become more simple and uniform, or more slender and delicate.

203. In the stamens and pistils the structure is still nearly the same. The fibro-vascular system, surrounded by and intermixed with the cellular tissue, is usually simple in the filaments and style, more or less ramified in the flattened or expanded parts, such as the anther-cases, the walls of the ovary, or carpellary leaves, etc. The pollen consists of granular cells variously shaped, marked, or combined, peculiar forms being constant in the same species, or often in large genera, or even Orders. The stigmatic portion of the pistil is a mass of loosely cellular substance, destitute of epidermis, and usually is in communication with the ovary by the channel running down the centre of the style.

204. Tubers, fleshy thickenings of the stem or other parts of the plant, succulent leaves or branches, the fleshy, woody, or bony parts of fruits, the albumen, and the thick fleshy parts of embryos, consist chiefly of largely developed cellular tissue, replete with starch or other substances (192), deposited apparently in most cases for the eventual future use of the plant or its parts when recalled into activity at the approach of a new season.

205. Hairs (171) are usually expansions or processes of the epidermis, and consist of one or more cells placed end to end. When thick or hardened into prickles, they still consist usually of cellular tissue only. Thorns (170) contain more or less of a fibro-vascular system, according to their degree of development.

206. Glands, in the primary sense of the word (175, 1), consist usually of a rather loose cellular tissue without epidermis, and often replete with resinous or other substances.

§ 3. *Growth of the Organs.*

207. Roots grow in length constantly and regularly at the extremities only of their fibres, in proportion as they find the requisite nutriment. They form no buds containing the germ of future branches, but their fibres proceed irregularly from any part of their surface without previous indication, and when their growth has been stopped for a time, either wholly by the close of the season, or partially by a deficiency of nutriment at any particular spot, it will, on the return of favourable circumstances, be resumed at the same point, if the growing extremities be uninjured. If during the dead season, or at any other time, the growing extremity is cut off, dried up, or otherwise injured, or stopped by a rock or other obstacle opposing its progress, lateral fibres will

be formed on the still living portion; thus enabling the root as a whole to diverge in any direction, and travel far and wide when lured on by appropriate nutriment.

208. This growth is not however by the successive formation of terminal cells attaining at once their full size. The cells first formed on a fibre commencing or renewing its growth, will often dry up and form a kind of terminal cap, which is pushed on as cells are formed immediately under it; and the new cells, constituting a greater or lesser portion of the ends of the fibres, remain some time in a growing state before they have attained their full size.

209. The roots of Exogens, when perennial, increase in thickness like stems by the addition of concentric layers, but these are usually much less distinctly marked; and in a large number of perennial Exogens and most Endogens the roots are annual, perishing at the close of the season, fresh adventitious roots springing from the stock when vegetation commences the following season.

210. The stem, including its branches and appendages (leaves, floral organs, etc.), grows in length by additions to its extremity, but a much greater proportion of the extremity and branches remains in a growing and expanding state for a much longer time than in the case of the root. At the close of one season, leaf-buds or seeds are formed, each containing the germ of a branch or young plant to be produced the following season. At a very early stage of the development of these buds or seeds, a commencement may be found of many of the leaves it is to bear; and before a leaf unfolds, every leaflet of which it is to consist, every lobe or tooth which is to mark its margin, may often be traced in miniature, and thenceforth till it attains its full size, the branch grows and expands in every part. In some cases however the lower part of a branch and more rarely (*e. g.* in some *Meliaceæ*) the lower part of a compound leaf attains its full size before the young leaves or leaflets of the extremity are yet formed.

211. The perennial stem, if exogenous (198), grows in thickness by the addition every season of a new layer or ring of wood between the outermost preceding layer and the inner surface of the bark, and by the formation of a new layer or ring of bark within the innermost preceding layer and outside the new ring of wood, thus forming a succession of concentric circles. The sap elaborated by the leaves finds its way, in a manner not as yet absolutely ascertained, into the *cambium-region*, a zone of tender thin-walled cells connecting the wood with the bark, by the division and enlargement of which new cells (190) are formed. These cells separate in layers, the inner ones constituting the new ring of wood, and the outer ones the new bark or liber. In most exogenous trees, in temperate climates, the seasons of growth correspond with the years, and the rings of wood remain sufficiently distinct to indicate the age of the tree; but in many tropical and some evergreen trees, two or more rings of wood are formed in one year.

212. In endogenous perennial stems (199), the new wood or woody fibre is formed towards the centre of the stem, or irregularly mingled with the old. The stem consequently either only becomes more dense without increasing in thickness, or only increases by gradual distention, which is never very considerable. It affords therefore no certain criterion for judging of the age of the tree.

213. Flowers have generally all their parts formed, or indicated by protuberances or growing cells at a very early stage of the bud. These parts are then usually more regularly placed than in the fully developed flower. Parts which afterwards unite are then distinct, many are present in this rudimentary state which are never further developed, and parts which are afterwards very unequal or dissimilar are perfectly alike at this early period. On this account flowers in this very early stage are supposed by some modern botanists to be more *normal*, that is, more in conformity to a supposed type; and the study of the early formation and growth of the floral organs, called *Organogenesis*, has been considered essential for the correct appreciation of the affinities of plants. In some cases, however, it would appear that modifications of development, not to be detected in the very young bud, are yet of great importance in the distinction of large groups of plants, and that Organogenesis, although it may often assist in clearing up a doubtful point of affinity, cannot nevertheless be exclusively relied on in estimating the real value of peculiarities of structure.

214. The flower is considered as a *bud* (*flower-bud, alabastrum*) until the perianth

expands, the *period of flowering* (*anthesis*) is that which elapses from the first expanding of the perianth, till the pistil is set or begins to enlarge, or, when it does not set, until the stamens and pistil wither or fall. After that, the enlarged ovary takes the name of *young fruit*.

215. At the close of the season of growth, at the same time as the leaf-buds or seeds are formed containing the germ of future branches or plants, many plants form also, at or near the bud or seed, large deposits, chiefly of starch. In many cases,—such as the tubers of a potato or other root-stock, the scales or thickened base of a bulb, the albumen or the thick cotyledons of a seed,—this deposit appears to be a store of nutriment, which is partially absorbed by the young branch or plant during its first stage of growth, before the roots are sufficiently developed to supply it from without. In some cases, however, such as the fleshy thickening of some stems or peduncles, the pericarps of fruits which perish long before *germination* (the first growth of the seed), neither the use nor the cause of these deposits has as yet been clearly explained.

§ 4. *Functions of the Organs.*

216. The functions of the Root are,—1. To fix the plant in or to the soil or other substance on which it grows. 2. To absorb nourishment from the soil, water, or air, into which the fibres have penetrated (or from other plants in the case of parasites), and to transmit it rapidly to the stem. The absorption takes places through the young growing extremities of the fibres, and through a peculiar kind of hairs or absorbing organs which are formed at or near those growing extremities. The transmission to the stem is through the tissues of the root itself. The nutriment absorbed consists chiefly of carbonic acid and nitrogen or nitrogenous compounds dissolved in water. 3. In some cases roots secrete or exude small quantities of matter in a manner and with a purpose not satisfactorily ascertained.

217. The Stem and its branches support the leaves, flowers, and fruit, transmit the crude sap, or nutriment absorbed by the roots and mixed with previously organized matter, to the leaves, and retransmit the assimilated or elaborated sap from the leaves to the growing parts of the plant, to be there used up, or to form deposits for future use (204). The transmission of the ascending crude sap appears to take place chiefly through the elongated cells associated with the vascular tissues, passing from one cell to another by a process but little understood, but known by the name of *endosmose*.

218. Leaves are functionally the most active of the organs of vegetation. In them is chiefly conducted digestion or *Assimilation*, a name given to the process which accomplishes the following results:—1. The chemical decomposition of the oxygenated matter of the sap, the absorption of carbonic acid, and the liberation of pure oxygen at the ordinary temperature of the air. 2. A counter-operation by which oxygen is absorbed from the atmosphere and carbonic acid is exhaled. 3. The transformation of the residue of the crude sap into the organized substances which enter into the composition of the plant. The exhalation of oxygen appears to take place under the influence of solar heat and light, chiefly from the under surface of the leaf, and to be in some measure regulated by the stomates; the absorption of oxygen goes on always in the dark, and in the daytime also in certain cases. The transformation of the sap is effected within the tissues of the leaf, and continues probably more or less throughout the active parts of the whole plant.

219. The Floral Organs seldom contribute to the growth of the plant on which they are produced; their functions are wholly concentrated on the formation of the seed with the germ of a future plant.

220. The Perianth (calyx and corolla) acts in the first instance in protecting the stamens and pistils during the early stages of their development. When expanded, the use of the brilliant colours which they often display, of the sweet or strong odours they emit, has not been adequately explained. Perhaps they may have great influence in attracting those insects whose concurrence has been shown in many cases to be necessary for the due transmission of the pollen from the anther to the stigma.

221. The pistil, when stimulated by the action of the pollen, forms and nourishes the young seed. The varied and complicated contrivances by which the pollen is con-

veyed to the stigma, whether by elastic action of the organs themselves, or with the assistance of wind, of insects, or other extraneous agents, have been the subject of numerous observations and experiments of the most distinguished naturalists, and are yet far from being fully investigated. Their details, however, as far as known, would be far too long for the present outline.

222. The fruit nourishes and protects the seed until its maturity, and then often promotes its dispersion by a great variety of contrivances or apparently collateral circumstances, *e. g.* by an elastic dehiscence which casts the seed off to a distance; by the development of a pappus, wings, hooked or other appendages, which allows them to be carried off by winds, or by animals, etc., to which they may adhere; by their small specific gravity, which enables them to float down streams; by their attractions to birds, etc., who taking them for food drop them often at great distances, etc. Appendages to the seeds themselves also often promote dispersion.

223. Hairs have various functions. The ordinary indumentum (171) of stems and leaves indeed seems to take little part in the economy of the plant besides perhaps some occasional protection against injurious atmospheric influences, but the root-hairs (216) are active absorbents, the hairs on styles and other parts of flowers appear often materially to assist the transmission of pollen, and the exudations of glandular hairs (175, 2) are often too copious not to exercise some influence on the phenomena of vegetation. The whole question, however, of vegetable exudations and their influence on the economy of vegetable life, is as yet but imperfectly understood.

Chap. IV. Collection, Preservation, and Determination of Plants.

224. Plants can undoubtedly be most easily and satisfactorily examined when freshly gathered. But time will rarely admit of this being done, and it is moreover desirable to compare them with other plants previously observed or collected. *Specimens* must, therefore, be selected for leisurely observation at home, and preserved for future reference. A collection of such specimens constitutes a *Herbarium*.

225. A botanical **Specimen,** to be perfect, should have *root*, *stem*, *leaves*, *flowers* (both open and in bud) and *fruit* (both young and mature). It is not, however, always possible to gather such complete specimens, but the collector should aim at completeness. Fragments, such as leaves without flowers, or flowers without leaves, are of little or no use.

226. If the plant is small (not exceeding 15 in.) or can be reduced to that length by folding, the specimen should consist of the whole plant, including the principal part of the root. If it be too large to preserve the whole, a good flowering branch should be selected, with the foliage as low down as can be gathered with it; and one or two of the lower stem-leaves or radical leaves, if any, should be added, so as to preserve as much as possible of the peculiar aspect of the plant.

227. The specimens should be taken from healthy uninjured plants of a medium size. Or if a specimen be gathered because it looks a little different from the majority of those around it, apparently belonging to the same species, a specimen of the more prevalent form should be taken from the same locality for comparison.

228. For bringing the specimens home, a light portfolio of pasteboard, covered with calico or leather, furnished with straps and buckles for closing, and another for slinging on the shoulder, and containing a few sheets of stout coarse paper, is better than the old-fashioned tin box (except, perhaps, for stiff prickly plants and a few others). The specimens as gathered are placed between the leaves of paper, and may be crowded together if not left long without sorting.

229. If the specimen brought home be not immediately determined when fresh, but dried for future examination, a note should be taken of the time, place, and situation in which it was gathered; of the stature, habit, and other particulars rela-

ting to any tree, shrub, or herb of which the specimen is only a portion; of the kind of root it has; of the colour of the flower; or of any other particulars which the specimen itself cannot supply, or which may be lost in the process of drying. These memoranda, whether taken down in the field, or from the living specimen when brought home, should be written on a label attached to the specimen or preserved with it.

230. To dry specimens, they are laid flat between several sheets of bibulous paper, and subjected to pressure. The paper is subsequently changed at intervals, until they are dry.

231. In laying out the specimen, care should be taken to preserved the natural position of the parts as far as consistent with the laying flat. In general, if the specimen is fresh and not very slender, it may be simply laid on the lower sheet, holding it by the stalk and drawing it slightly downwards; then, as the upper sheet is laid over, if it be slightly drawn downwards as it is pressed down, it will be found, after a few trials, that the specimen will have retained a natural form with very little trouble. If the specimen has been gathered long enough to have become flaccid, it will require more care in laying the leaves flat and giving the parts their proper direction. Specimens kept in tin boxes, will also often have taken unnatural bends which will require to be corrected.

232. If the specimen is very bushy, some branches must be thinned out, but always so as to show where they have been. If any part, such as the head of a thistle, the stem of an *Orobanche*, or the bulb of a Lily, be very thick, a portion of what is to be the under side of the specimen may be sliced off. Some thick specimens may be split from top to bottom before drying.

233. If the specimen be succulent or tenacious of life, such as a *Sedum* or an *Orchis*, it may be dipped in boiling water *all but the flowers*. This will kill the plant at once, and enable it to be dried rapidly, losing less of its colour or foliage than would otherwise be the case. Dipping in boiling water is also useful in the case of Heaths and other plants which are apt to shed their leaves during the process of drying.

234. Plants with very delicate corollas may be placed between single leaves of very thin unglazed tissue-paper. In shifting these plants into dry paper the tissue-paper is not to be removed, but lifted with its contents on to the dry paper.

235. The number of sheets of paper to be placed between each specimen or sheet of specimens, will depend, on the one hand, on the thickness and humidity of the specimens; on the other hand, on the quantity and quality of the paper one has at command. The more and the better the paper, the less frequently will it be necessary to change it, and the sooner the plants will dry. The paper ought to be coarse, stout, and unsized. Common blotting-paper is much too tender.

236. Care must be taken that the paper used is well dried. If it be likewise hot, all the better; but it must then be very dry; and wet plants put into hot paper will require changing very soon, to prevent their turning black, for hot damp without ventilation produces fermentation, and spoils the specimens.

237. For pressing plants, various more or less complicated and costly presses are made. None is better than a pair of boards the size of the paper, and a stone or other heavy weight upon them if at home, or a pair of strong leather straps round them if travelling. Each of these boards should be double, that is, made of two layers of thin boards, the opposite way of the grain, and joined together by a row of clenched brads round the edge, without glue. Such boards, in deal, rather less than half an inch thick (each layer about 2½ lines) will be found light and durable.

238. It is useful also to have extra boards or pasteboards the size of the paper, to separate thick plants from thin ones, wet ones from those nearly dry, etc. Open wooden frames with cross-bars, or frames of strong wire-work lattice, are still better than boards for this purpose, as accelerating the drying by promoting ventilation.

239. The more frequently the plants are shifted into dry paper the better. Excepting for very stiff or woody plants, the first pressure should be light, and the first shifting, if possible, after a few hours. Then, or at the second shifting, when the specimens will have lost their elasticity, will be the time for putting right any part of a specimen

which may have taken a wrong fold or a bad direction. After this the pressure may be gradually increased, and the plants left from one to several days without shifting. The exact amount of pressure to be given will depend on the consistence of the specimens, and the amount of paper. It must only be borne in mind that too much pressure crushes the delicate parts, too little allows them to shrivel, in both cases interfering with their future examination.

240. The most convenient specimens will be made, if the drying-paper is the same size as that of the herbarium in which they are to be kept. That of writing demy, rather more than 16 inches by 10½ inches, is a common and very convenient size. A small size reduces the specimens too much, a large size is both costly and inconvenient for use.

241. When the specimens are quite dry and stiff, they may be packed up in bundles with a single sheet of paper between each layer, and this paper need not be bibulous. The specimens may be placed very closely on the sheets, but not in more than one layer on each sheet, and care must be taken to protect the bundles by sufficient covering from the effects of external moisture or the attacks of insects.

242. In laying the specimens into the herbarium, no more than one species should ever be fastened on one sheet of paper, although several specimens of the same species may be laid side by side. And throughout the process of drying, packing, and laying in, great care must be taken that the labels be not separated from the specimens they belong to.

243. To examine or dissect flowers or fruits in dried specimens it is necessary to soften them. If the parts are very delicate, this is best done by gradually moistening them in cold water; in most cases, steeping them in boiling water or in steam is much quicker. Very hard fruits and seeds will require boiling to be able to dissect them easily.

244. For dissecting and examining flowers in the field, all that is necessary is a penknife and a pocket-lens of two or three glasses from 1 to 2 inches focus. At home it is more convenient to have a mounted lens or simple microscope, with a stage holding a glass plate, upon which the flowers may be laid; and a pair of dissectors, one of which should be narrow and pointed, or a mere point, like a thick needle, in a handle; the other should have a pointed blade, with a sharp edge, to make clean sections across the ovary. A compound microscope is rarely necessary, except in cryptogamic botany and vegetable anatomy. For the simple microscope, lenses of ¼, ½, 1, and 1½ inches focus are sufficient.

245. To assist the student in *determining* or ascertaining the name of a plant belonging to a Flora, analytical tables should be prefixed to the Orders, Genera, and Species. These tables should be so constructed as to contain, under each bracket, or equally indented, two (rarely three or more) alternatives as nearly as possible contradictory or incompatible with each other, each alternative referring to another bracket, or having under it another pair of alternatives further indented. The student having a plant to determine, will first take the general table of Natural Orders, and examining his plant at each step to see which alternative agrees with it, will be led on to the Order to which it belongs, he will then compare it with the detailed character of the Order given in the text. If it agrees, he will follow the same course with the table of the genera of that Order, and again with the table of species of the genus. But in each case, if he finds that his plant does not agree with the detailed description of the genus or species to which he has thus been referred, he must revert to the beginning and carefully go through every step of the investigation before he can be satisfied. A fresh examination of his specimen, or of others of the same plant, a critical consideration of the meaning of every expression in the characters given, may lead him to detect some minute point overlooked or mistaken, and put him into the right way. Species vary within limits which it is often very difficult to express in words, and it proves often impossible, in framing these analytical tables, so to divide the genera and species, that those which come under one alternative should absolutely exclude the others. In such doubtful cases both alternatives must be tried before the student can come to the conclusion that his plant is not contained in the Flora, or that it is erroneously described.

246. In those Floras where analytical tables are not given, the student is usually guided to the most important or prominent characters of each genus or species, either by a general summary prefixed to the genera of an Order or to the species of the genus, for all such genera or species; or by a special summary immediately preceding the detailed description of each genus or species. In the latter case this summary is called a *diagnosis*. Or sometimes the important characters are only indicated by italicizing them in the detailed description.

247. It may also happen that the specimen gathered may present some occasional or accidental anomalies peculiar to that single one, or to a very few individuals, which may prevent the species from being at once recognized by its technical characters. It may be useful here to point out a few of these anomalies which the botanist may be most likely to meet with. For this purpose we may divide them into two classes, viz.:

(1.) *Aberrations from the ordinary type or appearance of a species for which some general cause may be assigned.*

A bright, light, and open situation, particularly at considerable elevations above the sea, or at high latitudes, without too much wet or drought, tends to increase the size and heighten the colour of flowers, in proportion to the stature and foliage of the plant.

Shade, on the contrary, especially if accompanied by richness of soil and sufficient moisture, tends to increase the foliage and draw up the stem, but to diminish the number, size, and colour of the flowers.

A hot climate and dry situation tend to increase the hairs, prickles, and other productions of the epidermis, to shorten and stiffen the branches, rendering thorny plants yet more spinous. Moisture in a rich soil has a contrary effect.

The neighbourhood of the sea, or a saline soil or atmosphere, imparts a thicker and more succulent consistence to the foliage and almost every part of the plant, and appears not unfrequently to enable plants usually annual to live through the winter. Flowers in a maritime variety are often much fewer, but not smaller.

The luxuriance of plants growing in a rich soil, and the dwarf stunted character of those crowded in poor soils, are too well known to need particularizing. It is also an everyday observation how gradually the specimens of a species become dwarf and stunted as we advance into the cold damp regions of the summits of high mountain-ranges, or into high northern latitudes; and yet it is frequently from the want of attention to these circumstances that numbers of false species have been added to our Enumerations and Floras. Luxuriance entails not only increase of size to the whole plant, or of particular parts, but increase of number in branches, in leaves, or leaflets of a compound leaf; or it may diminish the hairiness of the plant, induce thorns to grow out into branches, etc.

Capsules which, while growing, lie close upon the ground, will often become larger, more succulent, and less readily dehiscent, than those which are not so exposed to the moisture of the soil.

Herbs eaten down by sheep or cattle, or crushed underfoot, or otherwise checked in their growth, or trees or shrubs cut down to the ground, if then exposed to favourable circumstances of soil and climate, will send up luxuriant side-shoots, often so different in the form of their leaves, in their ramification and inflorescence, as to be scarcely recognizable for the same species.

Annuals which have germinated in spring, and flowered without check, will often be very different in aspect from individuals of the same species, which, having germinated later, are stopped by summer droughts or the approach of winter, and only flower the following season upon a second growth. The latter have often been mistaken for perennials.

Hybrids, or crosses between two distinct species, come under the same category of anomalous specimens from a known cause. Frequent as they are in gardens, where they are artificially produced, they are probably rare in nature, although on this subject there is much diversity of opinion, some believing them to be very frequent, others almost denying their existence. Absolute proof of the origin of a plant found wild, is of course impossible; but it is pretty generally agreed that the following particulars must always co-exist in a *wild hybrid*. It partakes of the characters of its two parents;

it is to be found isolated, or almost isolated, in places where the two parents are abundant; if there are two or three, they will generally be dissimilar from each other, one partaking more of one parent, another of the other; it seldom ripens good seed; it will never be found where one of the parents grows alone.

Where two supposed species grow together, intermixed with numerous intermediates bearing good seed, and passing more or less gradually from the one to the other, it may generally be concluded that the whole are mere varieties of one species. The beginner, however, must be very cautious not to set down a specimen as intermediate between two species, because it appears to be so in some, even the most striking characters, such as stature and foliage. Extreme varieties of one species are connected together by transitions in all their characters, but these transitions are not all observable in the same specimens. The observation of a single intermediate is therefore of little value, unless it be one link in a long series of intermediate forms, and, when met with, should lead to the search for the other connecting links.

(2.) *Accidental aberrations from the ordinary type, that is, those of which the cause is unknown.*

These require the more attention, as they may sometimes lead the beginner far astray in his search for the genus, whilst the aberrations above mentioned, as reducible more or less to general laws, affect chiefly the distinction of species.

Almost all species with coloured flowers are liable to occur occasionally with them all white.

Many may be found even in a wild state with double flowers, that is, with a multiplication of petals.

Plants which have usually conspicuous petals will occasionally appear without any at all, either to the flowers produced at particular seasons, or to all the flowers of individual plants, or the petals may be reduced to narrow slips.

Flowers usually very irregular, may, on certain individuals, lose more or less of their irregularity, or appear in some very different shape. Spurs, for instance, may disappear, or be produced on all instead of one only of the petals.

One part may be occasionally added to, or subtracted from, the usual number of parts in each floral whorl, more especially in regular polypetalous flowers.

Plants usually monœcious or dioecious may become occasionally hermaphrodite, or hermaphrodite plants may produce occasionally unisexual flowers by the abortion of the stamens or of the pistils.

Leaves cut or divided where they are usually entire, variegated or spotted where they are usually of one colour, or the reverse, must also be classed amongst those accidental aberrations which the botanist must always be on his guard against mistaking for specific distinctions.

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FLORA OF TROPICAL AFRICA.

Class I. DICOTYLEDONS.

First rudimentary leaves of the embryo opposite. Calyx and corolla usually tetramerous or pentamerous. Leaves irregularly net-veined. Vascular bundles of the stem confluent around the pith, increasing indefinitely by additions to the outside.

The characters given in the following list of the Natural Orders which are included in this volume, are subject to many exceptions, but few of which are indicated here. It is proposed to give an Analytical Key to the Orders on the completion of the work.

SUBCLASS I. POLYPETALÆ.

Petals distinct, rarely wanting or connate at the base.

Cohort I. Ranales.—*Stamens indefinite* (*except* Menispermaceæ), *hypogynous* (*except* Nymphæa). *Carpels distinct, free or immersed singly in the torus, rarely connate below. Albumen usually copious. Embryo relatively small* (*except* Menispermaceæ).

I. Ranunculaceæ. Herbs with radical or alternate leaves, or shrubby climbers with opposite leaves. Stipules 0. Sepals deciduous. Petals 0 in *Clematis* and *Thalictrum*. Arillus 0.

II. Dilleniaceæ. Shrubs with alternate, simple, exstipulate, often scabrid leaves. Stipules 0. Sepals persistent. Seeds arillate.

III. Anonaceæ. Shrubs or trees, with alternate, entire, exstipulate leaves. Calyx and corolla trimerous. Carpels indefinite. Albumen ruminate.

IV. Menispermaceæ. Climbing or twining shrubs, rarely herbs. Leaves alternate, exstipulate, usually palminerved. Flowers small, dicœcious. Stamens 6 (3–9), free or connate.

V. Berberidaceæ. Shrub with fasciculate leaves. Sepals, petals, and stamens each in 2 or 3 series of 3 each. Anthers dehiscing by valves. Carpel 1.

VI. Nymphæaceæ. Floating herbs. Leaves orbicular or elliptical. Stamens indefinite. Carpels free or consolidated.

Cohort II. Parietales.—*Stamens definite or indefinite, hypogynous. Ovary syncarpous, with parietal placentation, 1-celled or spuriously divided by cellular placentary dissepiments. Ovules rarely solitary.*

VII. Papaveraceæ. Herbs, with radical and alternate leaves. Sepals 2–3, deciduous or caducous. Stamens indefinite or definite and diadelphous. Seeds albuminous.

VIII. Cruciferæ. Herbs, with alternate exstipulate leaves. Sepals 4. Petals 4. Stamens usually tetradynamous. Albumen 0.

IX. CAPPARIDACEÆ. Herbs shrubs or trees. Leaves alternate, simple or multifoliolate; stipules often aculeate. Petals 4. Stamens indefinite, rarely definite. Ovary often stipitate. Albumen 0.

X. MORINGACEÆ. Trees, with 2–3-pinnate, alternate leaves. Stamens 5 or 10. Albumen 0.

XI. RESEDACEÆ. Herbs or shrubs. Leaves alternate, entire or divided. Stipules minute. Calyx 4–7-partite. Petals 2–7 or 0 (*Ochradenus*), lamina divided or entire.

XII. VIOLACEÆ. Herbs shrubs or trees. Leaves alternate, stipulate. Petals 5. Stamens 5. Connective produced beyond the anther-cells.

XIII. BIXINEÆ. Shrubs or trees. Leaves alternate, simple. Stipules 0 or minute (very rarely conspicuous).

Cohort III. Polygalineæ.—*Sepals* 5, *unequal or equal. Petals* 5. *Stamens* 5–6 *or* 8, *free or monadelphous, hypogynous. Ovary* 2-*merous.*

XIV. PITTOSPOREÆ. Trees or shrubs. Leaves alternate, entire, exstipulate. Flowers regular.

XV. POLYGALEÆ. Herbs or shrubs. Leaves alternate, entire, exstipulate. Flowers irregular.

Cohort IV. Caryophyllineæ.—*Sepals* 2–4–5, *free or connate. Petals* 5, *rarely fewer or none, occasionally minute. Stamens* 5–10 *or* ∞, *hypogynous. Ovary* 1-*celled, with free central or parietal* (Frankeniaceæ) *placentation, rarely septate more or less* (Tamariscineæ). *Albumen mealy.*

XVI. FRANKENIACEÆ. Low herbs, with opposite, simple leaves. Placentas parietal.

XVII. CARYOPHYLLACEÆ. Herbs often woody or wiry below. Leaves opposite, simple. Flowers symmetrical. Stamens definite. Placenta free, central.

XVIII. PORTULACEÆ. Herbs or shrubs, usually succulent. Leaves alternate or opposite. Sepals 2. Placenta basal or free central.

XIX. TAMARISCINEÆ. Shrubs, slenderly branched, with minute or rudimentary alternate leaves. Sepals and petals each 4–6.

Cohort V. Guttiferales.—*Sepals* 2–6 *or more, imbricate. Petals as many, rarely more. Stamens indefinite, hypogynous. Ovary usually syncarpous, with axile placentation* (*parietal in* Allanblackia).

XX. ELATINEÆ. Herbs or shrubs, with opposite simple leaves and small axillary hermaphrodite flowers. Stamens definite.

XXI. HYPERICINEÆ. Herbs shrubs or trees. Leaves opposite or rarely alternate, simple, exstipulate. Flowers cymose, hermaphrodite. Stamens indefinite, often polyadelphous.

XXII. GUTTIFERÆ. Trees or shrubs, usually abounding in a yellow or greenish resinous juice. Leaves opposite, entire. Flowers usually dioecious or polygamous. Stamens indefinite, free or variously connate.

XXIII. TERNSTRŒMIACEÆ. Trees or shrubs, with alternate, simple leaves. Flowers hermaphrodite. Stamens indefinite, free or connate at the base.

XXIV. DIPTEROCARPEÆ. Trees or climbing shrubs, with alternate, entire, penninerved leaves. Flowers hermaphrodite. Calyx-lobes usually enlarged in fruit.

Cohort VI. Malvales.—*Sepals or calyx-lobes valvate. Petals as many as sepals or none. Stamens monadelphous or free, hypogynous. Ovary syncarpous, with axile placentation.*

XXV. MALVACEÆ. Herbs shrubs or trees, with alternate leaves. Stamens monadelphous, with 1-celled anthers.

XXVI. STERCULIACEÆ. Herbs shrubs or trees, with alternate leaves. Stamens monadelphous indefinite or definite, or free and definite, with or without alternating staminodia. Anthers 2-celled.

XXVII. TILIACEÆ. Trees shrubs or herbs, with alternate leaves. Stamens indefinite, free or shortly connate at the base. Anthers 2-celled.

Cohort VII. Geraniales.—*Ovary more or less deeply sulcate or lobed, more rarely entire* (Lineæ, Humiriaceæ, Burseraceæ, Meliaceæ, Chailletiaceæ). *Stamens hypogynous. Ovules* 1, 2 *or rarely indefinite, pendulous, with a ventral raphe.*

XXVIII. Lineæ. Shrubs or herbs, with alternate or rarely opposite (*Aneulophus*), simple leaves. Ovary undivided. Styles free or connate. Ovules 1 or 2 in each cell.

XXIX. Humiriaceæ. Tree, with alternate, coriaceous, glabrous leaves. Ovary undivided. Connective of the anthers fleshy, produced beyond the cells. Ovules solitary.

XXX. Malpighiaceæ. Shrubs, usually climbing, with opposite or alternate (*Acridocarpus*) leaves. Sepals often with dorsal glands. Ovary lobed. Ovules solitary. Fruit-carpels winged.

XXXI. Zygophylleæ. Herbs or shrubs, with opposite or alternate (*Nitraria*), 1–2-foliolate or pinnate leaves. Filaments often with a minute scale at the base. Ovary angled or lobed. Ovules 1, 2 or more in each cell.

XXXII. Geraniaceæ. Herbs, rarely shrubs, with alternate or opposite, usually stipulate leaves, which are not pellucid-dotted. Stamens 5, 10 or 15, all or only part antheriferous. Ovary lobed. Ovules 1 or 2. Fruit usually with a central prominent beak.

XXXIII. Rutaceæ. Trees shrubs or herbs, with opposite or alternate, simple or compound, exstipulate, gland-dotted leaves. Ovary lobed, usually surrounded by or inserted upon a fleshy disk. Ovules 1 or 2 in each cell.

XXXIV. Simarubeæ. Shrubs or trees, bitter to the taste, with alternate, simple or compound, eglandular leaves. Filaments usually pilose or with an adnate scale. Ovary lobed. Ovules 1 or 2 in each cell.

XXXV. Ochnaceæ. Shrubs or trees, with alternate, simple, glabrous, penniveined, stipulate leaves. Stamens 10–∞. Anthers linear, often elongate. Ovary deeply lobed. Fruit-carpels distinct, drupaceous.

XXXVI. Burseraceæ. Trees or shrubs, usually abounding in resin. Leaves alternate, exstipulate, 3-foliolate or pinnate, rarely 1-foliolate. Ovary entire. Ovules 2 or 1 in each cell. Albumen 0.

XXXVII. Meliaceæ. Trees or shrubs, with alternate, exstipulate, compound leaves. Stamens 8–10, monadelphous (in African genera). Ovary entire. Ovules 2 or 4 to 10 in each cell.

XXXVIII. Chailletiaceæ. Small trees or shrubs, with alternate, entire, stipulate leaves. Petals bifid. Ovary entire. Ovules 2 in each cell.

Cohort VIII. Olacales.—*Ovary entire,* 1–∞*-celled. Stamens hypogynous or subhypogynous. Ovules* 1–3 *in each cell, pendulous, with a dorsal raphe. Seeds usually albuminous.*

XXXIX. Olacineæ. Trees or shrubs, erect or scandent. Leaves alternate, simple, exstipulate. Petals free or connate, usually valvate. Ovary 1- or imperfectly 3–5-celled. Ovules usually solitary in each division of the ovary. Albumen rarely wanting.

XL. Ilicineæ. Glabrous shrub or tree, with alternate, simple, exstipulate leaves. Petals imbricate. Ovary 3–6-celled. Albumen copious.

Cohort IX. Celastrales.—*Disk fleshy, free or adnate to the calyx-tube. Stamens rarely more than petals, inserted around or within the margin of the disk or hypogynous. Ovules erect. Flowers small, usually hermaphrodite.*

XLI. Celastraceæ. Shrubs or trees. Leaves opposite or alternate, simple. Petals imbricate. Stamens alternate with the petals or only 3.

XLII. Rhamnaceæ. Shrubs or trees, with simple leaves. Calyx-lobes valvate. Petals small, concave. Stamens opposite to the petals.

XLIII. Ampelideæ. Shrubs often scandent, with jointed stems and alternate, simple or compound leaves. Calyx-lobes imbricate. Petals valvate, caducous. Stamens opposite to the petals.

Cohort X. Sapindales.—*Disk various. Stamens hypogynous or subhypogynous. Ovary entire or lobed. Ovules* 1 *or* 2 *in each cell, ascending, pendulous or laterally affixed, rarely indefinite. Flowers most frequently unisexual or polygamous. Leaves most frequently compound. Trees or shrubs, rarely herbs.*

XLIV. SAPINDACEÆ. Trees or shrubs, rarely frutescent herbs, with alternate compound leaves. Style 1. Ovules ascending or horizontal.

XLV. ANACARDIACEÆ. Trees or shrubs, usually abounding in a resinous juice. Leaves rarely simple, alternate, often tufted at the ends of the branches. Styles 1–4, or stigmas subsessile. Ovules solitary, suspended or laterally affixed.

Cohort XI. Rosales. *Flowers regular or irregular, usually hermaphrodite. Stamens more or less distinctly perigynous. Styles distinct.*

XLVI. CONNARACEÆ. Trees or shrubs, with 1–3-foliolate or pinnate leaves. Flowers regular. Stamens definite. Carpels free, 1–5. Ovules 2, ascending, orthotropous.

XLVII. LEGUMINOSÆ. Trees shrubs or herbs. Leaves usually compound. Flowers irregular or regular. Stamens definite or indefinite, free or connate. Carpel solitary. Ovules 1–2–∞, anatropous or amphitropous, attached to the ventral suture.

ORDER I. RANUNCULACEÆ (by Prof. Oliver).

Flowers regular or irregular (*Delphinium*). Sepals 3 or more, usually 5, often petaloid, deciduous. Petals 5, or more, or fewer, or 0. Stamens indefinite (sometimes few), hypogynous, free. Pistil usually apocarpous. Carpels 1 or more. Ovules anatropous, ascending or pendulous, solitary or several. Fruit of 1 or more achenes or follicles (in tropical African species). Seeds with a fleshy albumen and very minute embryo, without an arillus.—Herbs, with radical or alternate cauline leaves, or more or less woody, and then often climbing with opposite leaves (*Clematis*). Leaves entire or divided, rarely stipulate.

An Order, widely dispersed through temperate and cold climates, especially of the northern hemisphere, but rare and generally confined to mountain ranges between the tropics. The species are usually more or less acrid and caustic, many of them dangerously so. Two genera, *Anemone* and *Knowltonia*, which are absent from the tropics, occur in the 'Cape Flora.'

Stem woody, climbing or erect. Leaves opposite. Sepals valvate (rarely imbricate). Petals 0	1. CLEMATIS.
Herbaceous.	
Flowers regular. Petals 0. Carpels 1-ovulate	2. THALICTRUM.
Flowers regular. Petals 3–∞. Carpels 1-ovulate	3. RANUNCULUS.
Flowers irregular. Post. sepal spurred. Ovules ∞	4. DELPHINIUM.

1. CLEMATIS, Linn.; Benth. and Hook. f. Gen. Pl. i. 3.

Sepals usually 4, rarely more, petaloid, valvate in æstivation, deciduous. Petals 0, or smaller than the sepals. Stamens indefinite; anthers linear. Carpels indefinite, each with a solitary pendulous ovule. Achenes capitate. Style persistent, in the African species growing out, after flowering, into a long plumose tail.—Usually climbing, rarely erect shrubs, with opposite, pinnately or ternately divided, rarely simple leaves, and terminal or axillary, panicled or solitary, white, cream-coloured, greenish or purple flowers.

A large genus, widely dispersed through temperate countries, occurring between the tropics chiefly in mountainous regions. The tropical African species appear to be endemic with one exception. Two of the most peculiar, *C. chrysocarpa* and *C. Kirkii*, are closely allied to species native in Madagascar.

Stem erect, or nearly so. Flowers terminal, solitary or peduncles 1-flowered, in loose corymbose cymes.

Flowers solitary, terminating simple, more or less leafy stems, of 1–2 ft. or more. Leaflets 3–1, more or less obovate or linear-oblong . . . . . 1. *C. chrysocarpa.*
Flowers loosely cymose. Leaflets 7–1, coriaceous, usually more or less ovate, broadly lobed, toothed and incised . . . . . 2. *C. Kirkii.*
Flowers loosely cymose. Leaves various, pinnati- or bipinnatisect; leaflets oblong-cuneate, acutely incised . . . . . 3. *C. Stanleyi.*
Stem climbing. Flowers in terminal or axillary panicles, exinvolucrate. Sepals spreading or reflexed at the time of flowering.
Leaflets variable, more or less ovate, obtuse or acute, irregularly and broadly toothed or lobed, glabrous or pubescent . . . . . 4. *C. Thunbergii.*
Leaflets ovate or ovate-lanceolate, acute or shortly acuminate, denticulate-serrate or nearly entire, glabrous, rarely hairy below . . 5. *C. simensis.*
Leaflets ovate, cordate or rounded at base, broadly toothed and lobed, pubescent above, pilose or silky, often with prominent veins in the older leaves, beneath. Axillary panicles equalling or shorter than the leaves . . . . . 6. *C. grata.*
Stem climbing. Flowers axillary, solitary. Peduncles with a 2-leaved involucre, or pair of bracts below the flower. Sepals scarcely spreading . . . . . 7. *C. longicauda.*
Stem climbing.
Calyx campanulate (sepals erect) at flowering . . . . . 8. *C. grandiflora.*

1. **C. chrysocarpa,** *Welw. mss.* Erect, 1–2 ft. Branches grooved, pilose or pilose-pubescent, sometimes glabrescent at base. Upper leaves usually 3-foliolate; lower often 1-foliolate, terminal or solitary leaflet from linear-oblong or oblanceolate to obovate-cuneate, narrowed or more rarely slightly rounded below, often 3-lobate, broadly toothed or subentire, dentate only towards the apex; teeth mucronulate, silky or sparsely pilose below, thinly pilose, or glabrescent above, 1½–4 in. long, 5–15 lines broad. Flowers solitary, 1½–4½ in. diam., white; sepals 4–6, broadly oblong or ovate-subacuminate, pilose or tomentose-pubescent externally or on both sides. Filaments compressed, silky below, much longer than the anthers. Achenes silky-pilose, with long plumose tails.

Nile Land. White Nile, *Petherick!* waste ground, Usni, common (a broader-leaved form), *Speke and Grant!*
Lower Guinea. Huilla, Angola, *Dr. Welwitsch!*
Heads of fruit in Dr. Welwitsch's specimens, about 4 in. in diam., the tails of the achenes being more or less recurved when dry. *Clematis trifida,* Hook. Ic. Plant. 79, a Madagascar plant, is a near ally of this species.

2. **C. Kirkii,** *Oliv.* Branches shortly pubescent, tomentose at first, at length nearly glabrous. Leaves pinnatisect; the lower oblong in circumscription, with about 7 leaflets; upper with 3 or reduced to a single one; leaflets coriaceous, more or less ovate 3-lobate and deeply toothed, obtuse; teeth obtuse, mucronulate; of the upper leaves, narrow, acute or obtuse, incised-dentate, pilose-pubescent beneath, excepting on the principal reticulating veins, at length glabrescent, glabrescent above, 1½–2½ in. long, ½–1½ in. broad. Flowers on erect peduncles, about 1½–2 in. diam.; sepals elliptical or ovate-elliptical, obtuse or broadly and obtusely apiculate, thick and coriaceous, tomentose-pubescent on both surfaces. Filaments pilose below, considerably longer than the anthers. Tails of the achenes soon more or less recurved after flowering.

Mozamb. Distr. Manganya hills, 3000 ft. alt., *Dr. Kirk!*

Nearly related to *C. Bojeri*, Hook. Ic. Plant. 10, of Madagascar, as well as to *C. Stanleyi*; differing from the latter in the round-based petiolulate, coriaceous or rigid leaflets of the lower leaves, the prominent venation beneath, and generally glabrescent or thinly pubescent (not silky) foliage.

3. **C. Stanleyi,** *Hook. Ic. Plant.* 589. Erect, 2–4 ft., more or less cæspitose, from a woody base, giving off, above the middle, axillary, erect, 1-flowered, often bracteate peduncles, shortly tomentose, silky or pubescent. Leaves very various, simply pinnatisect, 5-foliolate, the lateral leaflets oblong-cuneate, acute, with but 1 or 2 lateral teeth, or leaflets 3–5-fid, with very obtuse segments, or leaves bipinnately divided, leaflets oblanceolate-cuneate, acutely incised, more or less silky on both surfaces. Bracts usually incised, 1 in. long or much less, at various distances below the flower. Flowers $1\frac{1}{2}$–$2\frac{1}{2}$ in. diam. Sepals 4–6, thick, closely tomentose, very obtuse, broadly imbricate. Heads of fruit beautifully silvery; plumose tails of the achenes recurved.

Lower Guinea. Huilla and Pungo Andongo, Angola, *Dr. Welwitsch!* Found also in the Macalisberg and Transvaal, south of the tropic.

4. **C. Thunbergii,** *Steud.*; *Harv. Fl. Cap.* i. 2. Climber. Branches minutely pubescent or glabrous. Leaves various, pinnati- or ternati-sect, occasionally bipinnately divided, with 3-foliolate pinnæ; leaflets ovate, ovate-cordate or -lanceolate, broadly and unequally crenately toothed or incised; teeth mucronulate, thinly silky-pubescent or glabrate, 1–$2\frac{1}{2}$ in. long, 1–$1\frac{1}{2}$ broad, but very variable in size. Flowers $\frac{3}{4}$–2 in. diam., in axillary or terminal, free- or many-flowered panicles. Buds, when dry, frequently pointed. Sepals elliptic-oblong or broadly lanceolate, usually acute or narrowed above, more or less silky or pubescent on both surfaces. Filaments compressed, pilose or ciliate below. Carpels silky.—*C. hirsuta*, Guill. et Perr. Fl. Seneg. i. 1.

Upper Guinea. Senegambia, *Perrottet, Ingram!*

Nile Land. Abyssinia, *Schimper!* Ukidi and Madi, *Speke and Grant!*

Lower Guinea. Huilla, Angola, *Dr. Welwitsch!*

Var. *glaucescens.* Abyssinia, *Schimper! Dillon. C. glaucescens*, Fresen. in Mus. Senck. ii. 268.

Dr. Welwitsch's specimens have larger flowers than the rest, but do not otherwise differ.

Very nearly allied to *C. brachiata*, Thunb., and doubtfully distinct. The acute flower-buds appear generally to distinguish it, as pointed out by Dr. Harvey. *C. brachiata*, of Schweinfurth and Ascherson's Enum. of Nile Plants, I presume to be the same.

5. **C. simensis,** *Fresen. in Mus. Senck.* ii. 267. Branches glabrous, the extremities often minutely puberulous. Leaves pinnatisect; leaflets membranous, on rather long petioles, usually 5, 3, or reduced to 1 towards the extremities ovate or ovate-lanceolate, more or less acuminate, base rounded or subcordate except in the narrow-leaved forms, crenate-serrate; the teeth mucronulate usually glabrous on both surfaces, 2–4 in. long, 1–2 in. broad. Unifoliolate leaves sometimes more or less deeply trifid. Panicles many-flowered. Pedicels slender, $\frac{1}{2}$–1 in. Flowers about $\frac{3}{4}$ in. diam. Sepals oblong or oval, obtuse or somewhat pointed, usually minutely pubescent outside, shortly silky-hairy within. Filaments pilose below. Carpels hairy, tails 1 in. or more in length.

Upper Guinea. Cameroons Mountain, climbing 20–30 ft., 4000–8000 ft., *Mann!* Clarence Peak, Fernando Po, *Mann!*
Nile Land. Mountains of Abyssinia, *Schimper!*
Lower Guinea. Bumbo, Angola, *Dr. Welwitsch!*

Var. β. Leaves hairy beneath. Aukober, Abyssinia, *Roth!*
A specimen in fruit only, with nearly entire leaflets, probably belonging to this species, Congo, *Smith!* Allied to *C. mauritiana*, Lam.

6. **C. grata,** *Wall. Pl. As. Rar.* 98. Climber. Branches pubescent. Leaves pinnatisect; leaflets petiolulate, 5, 3, or 7, ovate, acute or obtuse, base cordate, broadly and irregularly crenately toothed, occasionally 3-lobate, pubescent or at length glabrescent above, silky-tomentose or pubescent beneath. Axillary panicles shorter than or equalling the leaves. Flowers about ¾ in. diam. Sepals spreading or reflexed, ovate, acute or subacute, silky externally, pubescent or nearly glabrous within. Inner filaments more or less pilose.—*C. inciso-dentata*, Rich. Fl. Abyss. i. 2. *C. Petersiana*, Kl. in Peters, Mossamb. 170. *C. viridiflora*, Bertol. Misc. Bot. xix. 7. t. 3.

Nile Land. Abyssinia, *Dillon and Petit!* Uganda, *Speke and Grant!*
Lower Guinea. Angola, *Dr. Welwitsch!*
Mozamb. Distr. Zambesi, *Dr. Peters!*
In Asia, this species extends eastward to the Western Himalaya, reappearing in China.
Dr. Welwitsch collected in Pungo Andongo, Angola, a Clematis just coming into flower, perhaps allied to this species. It has bipinnatisect leaves, leaflets or segments ovate-oblong, distantly mucronate-serrate or toothed, and a large, terminal, erect, cymose panicle. Sepals pubescent on both sides.

7. **C. longicauda,** *Steud.; Rich. Fl. Abyss.* i. 2. Branches pilose. Leaflets hairy and much reticulated on both surfaces; petioles and petiolules fulvous-villous. Involucral bracts broadly ovate or cordate-ovate, irregularly incised, about 1 in. below the expanded flower. Sepals rather thick, densely silky-pilose with fulvous (when dry) hairs, 1–1½ in. long. Filaments pilose. Anthers minutely mucronulate.

Nile Land. Abyssinia, *Schimper!*
The only tropical African species belonging to De Candolle's section *Cheiropsis*.
The specimen in the Kew herbarium, received from the Paris Museum (n. 873 of Schimper's 1853 collection), is in flower only, and ill accords with Richard's description, based upon fruiting specimens.

8. **C. grandiflora,** *DC. Prod.* i. 6. A slender climbing shrub. Leaves usually pinnately 5-foliolate; leaflets petiolulate, ovate to ovate-lanceolate, acute or apiculate, usually more or less cordate at base, broadly crenate-dentate or denticulate; teeth mucronulate, thinly pilose beneath or glabrescent, 2–6 in. long, 1–3½ in. broad. Flowers greenish, campanulate, axillary, usually solitary. Peduncles shorter than or equalling the leaves, with a pair of small bracts near or below the middle. Sepals 1–1½ in., oblong or ovate-oblong, shortly recurved at the apex, tomentose externally. Filaments very slender, pilose, many times exceeding the anther. Softly plumose tails of the achenes loosely spreading, 2–3 in. or more in length.—*C. chlorantha*, Lindl. Bot. Reg. 1234.

Upper Guinea. Sierra Leone, *Afzelius!* and others.
Lower Guinea. Golungo Alto and Cazengo, Angola, *Dr. Welwitsch!*

C. zanzibarensis, *Boj. in Loud. Hort. Brit.* 228, I do not know. I have not seen any sufficient description of it.

2. **THALICTRUM,** Linn.; Benth. and Hook. f. Gen. Pl. i. 4.

Sepals 3 to 5, imbricate in æstivation, early deciduous. Petals 0. Stamens 5–8 or more numerous. Anthers linear or linear-oblong. Carpels solitary or several (5–10), each with a solitary, pendulous ovule. Achenes sessile or stipitate; stigma deciduous or persistent.—Perennial herbs with alternate, much-divided leaves with sheathing bases. Flowers usually panicled, rather small, greenish, purplish, yellowish, or white.

A considerable genus of temperate and alpine countries, most numerous in species in Europe and Asia; between the tropics confined to mountainous or elevated regions. One of the following species is endemic and presents some remarkable peculiarities.

Carpel solitary, stipitate. Style elongate-filiform, longitudinally stigmatose, persistent. Fruit-pedicels hair-like, very long . . 1. *T. rhynchocarpum.*
Carpels several (7–10), sessile; stigma broadly ovate or subcordate, with revolute margins, so as to appear conical and sessile upon the young achene. Fruit-pedicels not lengthening . . . . . 2. *T. minus.*

1. **T. rhynchocarpum,** *Dill. et Rich. in Ann. Sc. Nat. Ser.* 2. xiv. 262. Stem erect, terete, glabrous, 4–10 ft. high. Leaves 2–4-pinnate; leaflets simple or ternate, usually ovate or more or less cordate, 3-lobed or broadly 3–7-toothed; teeth obtuse or minutely apiculate, glabrous. Panicle diffuse, with numerous small, greenish flowers upon hair-like pedicels, which grow out after flowering to 1–6 in. in length. Sepals 3 or 4, obovate or broadly elliptical. Stamens usually 5–10, with apiculate anthers. Ovary shortly stipitate. Achene strongly 3-ribbed on each side, tapering below into a slender stipe nearly its own length, above into the elongate style.—*T. longipedunculatum*, Hochst. et Steud. in Pl. Schimp. Abyss.

Upper Guinea. Clarence Peak, Fernando Po, 10,000 ft., *Mann!* Cameroons, 7000 ft., *Mann!*

Nile Land. Mountains of Abyssinia, *Schimper! Petit!*

Occurs also south of the tropic in Orange Free State and Katberg.

One of the most remarkable species of the genus, differing from the more typical forms in the solitary carpel and long persistent style, as well as in the remarkably long, capillary fruit-pedicels.

2. **T. minus,** *Linn.; DC. Prod.* i. 13, var. *scabrivena.* A glabrous or nearly glabrous herb, attaining often several feet in height, with an erect or somewhat zigzag, glabrous, smooth or slightly furrowed stem. Leaves 2–3-pinnate; leaflets 3-lobed or variously incised, rather glaucous below, with the prominent veins scattered with microscopic setæ. Panicle leafy.

Nile Land. Abyssinia, *Schimper!*

A variable species, widely spread in Europe and temperate Asia. Many of the more marked varieties have been distinguished as species.

T. Schimperianum, *Hochst.*, described in Schweinfurth's Fl. Æthiop. 78, I take to be also a variety of *T. minus.* It is said to have the *facies* of *T. flexuosum*, Bernh. Collected in the Buchit Mountain, Abyssinia, by Schimper.

3. **RANUNCULUS,** Linn.; Benth. and Hook. f. Gen. Pl. i. 5.

Sepals 3 to 5 (usually 5), imbricate in æstivation, early deciduous. Petals

3 to 20, each with a scale or pit near the base on the inner side. Stamens indefinite, in small-flowered species often few. Carpels indefinite, each with a solitary ascending ovule. Achenes capitate or shortly spicate, beaked with the persistent style, which is often very minute.—Annual or perennial herbs, with entire or divided radical leaves and usually alternate, rarely nearly opposite, leaves upon the stem. Flowers pedunculate, terminal or rarely axillary or sessile and opposite to the leaves, yellow white or red.

A large genus of temperate and cold climates; between the tropics, usually confined to mountain ranges. Five of the Tropical African species appear to be peculiar to the continent; but it is probable, were the entire genus thoroughly worked up, that some of them would prove varieties or geographical races of more widely-spread species.

Aquatic plant; the submerged leaves dissected, with filiform segments.
Flowers white. Carpels transversely wrinkled (*Batrachium*) . 1. *R. aquatilis.*
Stems 2- or more-flowered, exceeding the pinnatifid radical leaves.
Flowers pedunculate.
Lowest pinnæ usually petiolulate; segments ovate, obovate- or oblanceolate-cuneate, 3-lobed and incised. Petals 5. Achenes numerous . . . . . 2. *R. pinnatus.*
Radical leaves pinnately laciniate; segments linear or narrow-oblong.
Petals 10–15 or more. Achenes not very numerous . . . . 3. *R. simensis.*
Stems 1- or more-flowered; peduncles exceeding or shorter than the trifid radical leaves. Segments of the leaves obovate-cuneate, broadly 3-toothed or irregularly incised. Petals 5. Root fibrous, thickened, long and tapering . . . . . 4. *R. oligocarpus.*
Peduncles shorter than or scarcely exceeding the radical leaves, which are 3-partite, with deeply 3-fid, often incised segments. Petals 10 or more. Root fibrous, not thickened . . . . . 5. *R. tembensis.*
Stems 1- or more-flowered, not exceeding the radical leaves, which are pinnatisect, with 3–4 pairs sessile ovate segments. Petals 5 . . 6. *R. orcophytus.*
Flowers small, sessile or the lower ones on short peduncles, leaf-opposed.
Leaves petiolate, 3-partite; segments cuneate, incised . . . . . 7. *R. distrias.*

1. **R. aquatilis,** *Linn.; DC. Prod.* i. 26. Floating in fresh or brackish water or creeping upon mud, with a branching flaccid stem, often long-drawn out in running water. Submerged leaves divided into capillary, filiform or narrow-linear segments, flaccid or moderately firm. Floating, or upper leaves, more or less rounded in circumscription and variously lobed or cut, often wanting. Flowers axillary, solitary. Stamens often very few.

Nile Land. Abyssinia, prov. Ouodgerate, *Petit* (*ex Rich.*), and var. *capillaceus*, with all the leaves divided into capillary segments; Mount Silke, *Schimper.*—A very variable species in the circumscription of its leaves and in the form of the lobes of the floating ones; like many other aquatic plants, widely dispersed over the globe.

2. **R. pinnatus,** *Poir.; DC. Prod.* i. 42. Stems from a tufted rootstock, erect or ascending, unless in marshy ground or amongst tall grass, 1–2 ft. or more in height, loosely or shortly pilose or glabrescent, with more or less adpressed short hairs above and on the peduncles, pilose with short spreading hairs below. Lowest divisions of the radical leaves 3-fid or 3-partite; the teeth and lobes somewhat acute, glabrescent or with adpressed hairs above, usually more or less loosely pilose beneath. Uppermost leaves sessile, 3-fid or deeply incised, rarely entire. Sepals spreading or somewhat reflexed. Head of achenes globose or broadly ellipsoidal. Achenes compressed, bordered, glabrous, sides with scattered tubercles, sometimes very few or none, the carpels being nearly smooth. The tuberculed carpels appear to be charac-

teristic of the species, but the smooth-carpelled forms are connected by intermediates, in which the minute tubercles are few or nearly solitary. Beak of the achenes stout, slightly or not at all hooked.—*R. membranaceus*, Fresen. in Mus. Senck. ii. 207 (ex descr.). *R. striatus*, Hochst.; Rich. Fl. Abyss. i. 8.

Nile Land. Abyssinia, *Schimper! Parkyns!*
Lower Guinea. Huilla, Angola, *Dr. Welwitsch!*
Mozamb. Distr. Marenga M'khali (6° 44′ S. lat.), *Speke and Grant!* Zambezia, *Dr. Kirk!*

Var. *extensa*, Hook. f. in Journ. Linn. Soc. vi. 5. A weak, sometimes rooting variety, with the lower leaflets on rather long petiolules; the achenes much fewer, nearly or quite smooth, with a subulate, uncinate beak. Probably a distinct species. It is nearly allied to a species from Madagascar in the Kew herbarium.—Clarence Peak, Fernando Po, 8500 ft., *Mann!*

3. **R. simensis,** *Fresen. in Mus. Senck.* ii. 269. Erect or ascending from a tufted rootstock, giving off strong fibrous roots below, from 3 in. to 1 or 2 ft. high, with few scattered hairs. Leaves sparsely pilose or glabrescent; lobes obtuse. Peduncles with adpressed hairs. Sepals spreading. Head of achenes short, rather broader than long; achenes compressed, glabrous, with a rather short, triangular-subulate, more or less hooked beak.—*R. Schimperianus*, Hochst.; Rich. Fl. Abyss. i. 4.

Nile Land. Abyssinia, *Schimper!*

Var. *stagnalis* (*R. stagnalis*, Hochst.; Rich. Fl. Abyss. i. 5). Leaves pinnately- or palmately-partite; segments 3-fid or incised, with lanceolate or oblong teeth. Early flowers small, on rather stout curved lateral peduncles.—Abyssinia, *Schimper!*

4. **R. oligocarpus,** *Hochst.; Rich. Fl. Abyss.* i. 5. A low, diffuse herb, with long, rather fleshy, tapering root-fibres and weak spreading stems, 3–12 in. long. Teeth of the 3-fid radical leaves rather acute or obtuse, sparsely pilose or glabrescent. Peduncles with loose, spreading hairs. Carpels few, compressed, very shortly beaked.

Nile Land. Abyssinia, *Schimper!*

5. **R. tembensis,** *Fresen. in Mus. Senck.* ii. 271. Low plant with a tufted rootstock, giving off numerous strong fibres below, more or less pilose, with loose spreading hairs. Lobes of the leaves scarcely acute, loosely pilose. Petals rather narrow, oblanceolate, numerous. Carpels more or less compressed, smooth, glabrous, with a flattened, triangular-subulate, acute, scarcely hooked beak.—*R. dertropodius*, Steud.; Rich. Fl. Abyss. i. 5. (*? R. stenocarpus*, Steud.; Rich. l. c. 6).

Nile Land. Abyssinia, *Schimper!*
I have not seen Fresenius's specimens, but his description is sufficiently detailed to enable me to identify at least one of the synonyms quoted satisfactorily.

6. **R. oreophytus,** *Delile in Ann. Sc. Nat. Ser.* 2. xx. 89. Herb of 2 or 3 inches. Leaves radical, pinnatipartite; lateral segments in 3 4 pairs, more or less ovate, each usually with a lateral tooth on each side, subsessile; hairs few and long or none. Scape very short, not exceeding the leaves. Petals 5, obovate-oblong. Fruit undescribed.—Ferret et Galinier, Voy. Abyss. iii. 87; Atlas Bot. 13. *R. tenuirostris*, Steud. in Schimp. Herb. Abyss., *fide* Rich. Fl. Abyss. i. 4.

Nile Land. Abyssinian mountains, at a great elevation, *Galinier*, *Schimper*.

7. **R. distrias,** *Steud.*; *Rich. Fl. Abyss.* i. 7. A diffuse annual herb, with a fibrous root and numerous spreading or ascending, leafy, glabrous or loosely pilose stems. Leaves all or nearly all petiolate; segments with 3 or more incised, unequal, rather acute teeth, glabrous or with few scattered hairs. Flowers small. Petals oblanceolate. Achenes usually 8–15, compressed, with a very short beak, the sides tubercled or smooth.

Var. *a.* Carpels smooth (*R. distrias*, Steud.).
Var. *b.* Carpels tuberculate (*R. cuneilobus*, Rich. Fl. Abyss. i. 7. t. 3.)
Nile Land. Abyssinia, *Schimper! and Dillon* (*Rich.*).
Nearly related to *R. parviflorus*, Linn., of which species it may be a marked variety.

4. DELPHINIUM, Linn.; Benth. and Hook. f. Gen. Pl. i. 9.

Flowers irregular. Sepals 5, petaloid, posterior one prolonged into a spur behind. Petals 2 or 4 (2 posterior, each prolonged into a spur within the spur of the posterior sepal; 2 lateral, when present, ecalcarate). Stamens indefinite. Carpels 1–7 (3 in the Tropical African species), sessile, free, multiovulate, follicular when ripe.—Erect, annual or perennial herbs, with alternate, palmately-lobed or -dissected leaves, and showy racemose or panicled, blue purple red white or rarely yellow flowers.

A considerable genus, confined to the north temperate zone; some species affecting mountainous, others dry and hot situations. The only tropical African species extends to the mountains of the Dekhan in India.

1. **D. dasycaulon,** *Fresen. in Mus. Senck.* ii. 272 (sect. *Delphinastrum*, DC.). Stem erect, branched or simple, ½–3 ft., shortly pilose with spreading hairs or sometimes glabrescent below, with few scattered petiolate leaves. Radical leaves roundish-reniform or -cordate, broadly and deeply 5-lobed; lobes broadly and irregularly incised, 3–6 in. diam.; cauline leaves deeply 5-partite; segments acutely 3-lobed, unequally, acutely and remotely incised, more or less pilose above and below. Racemes rather loose, hairy, with linear bracts. Flowers blue; sepals hairy externally, especially towards the slightly recurved obtuse spur, which is about half as long (or little more) as the posterior sepal; calcarate posterior petals cartilaginous; limb broadly linear, oblique, obtuse, 2-fid; limb of anterior petals bilobate, pilose. Carpels 3, shortly pilose or tomentose.

Nile Land. Abyssinia, in mountainous situations, *Salt! Schimper!* and others.

ORDER II. DILLENIACEÆ (by Prof. Oliver).

Sepals 5 (3–7), broadly imbricate, persistent. Petals 5 (2–7), imbricate, deciduous. Stamens hypogynous, in African species indefinite, free, or the filaments very shortly coherent; anthers innate, dehiscing longitudinally or by terminal pores. Carpels free, rarely cohering; ovaries 1-celled, with 1 or more ovules. Styles distinct, diverging; stigmas simple. Fruit-carpels (in African species) dry, coriaceous, 1- or few-seeded, dehiscing by one or both sutures. Seeds with a very minute embryo and fleshy albumen, furnished with an arillus.—Trees or shrubs, usually climbing, or herbs, with al-

ternate, rarely-divided, simple leaves. Stipules 0 or inconspicuous. Flowers usually white or yellow, hermaphrodite or sometimes unisexual.

A considerable tropical and Australian family, of which the only African genus belongs to a Tribe (*Delimeæ*) characterized by penniveined, often scabrous leaves, and filaments dilated at the apex.

1. TETRACERA, Linn.; Hook. f. and Benth. Gen. Pl. i. 12.

Sepals 4–7, coriaceous. Petals as many or fewer. Stamens indefinite, free or very slightly coherent below; filaments dilated at the apex; anther-cells minute, on the margin of the dilated connective, approximate or distinct at the apex, more or less divergent or nearly parallel below, dehiscing longitudinally. Carpels free, usually 3, with several or numerous ovules upon the ventral suture, when ripe coriaceous, dehiscing by both sutures or by the ventral suture only. Seeds 1–5 in each carpel; arillus laciniate.—Usually climbing shrubs, with denticulate or entire, often scabrous leaves, the lateral nerves parallel with the margin. Flowers usually white, paniculate; panicles terminal and from the axils of the upper leaves.

A genus of 20 to 30 species, widely dispersed through the tropics of both the New and Old World. The African species are all endemic, though nearly allied to Brazilian and Indian species.

Panicles usually many-flowered, exceeding the leaves.
- Flowers ½ in. diam. or less. Leaves glabrescent or with adpressed hairs beneath.
  - Sepals densely silky-hairy within. Leaves usually distinctly denticulate above . . . . . 1. *T. obtusata.*
  - Sepals glabrous or nearly so within. Leaves entire or obscurely denticulate above . . . . . 2. *T. alnifolia.*

Flowers few, scarcely or not exceeding the leaves, nearly 1 in. diam.
- Leaves oblanceolate, denticulate, tomentose beneath, rugose above. . 3. *T. Boiviniana.*

1. **T. obtusata,** *Planch. in Hb. Kew.* Branches scabrous. Upper leaves obovate or elliptical, usually obtusely rounded and denticulate at the extremity, either narrowed into the petiole or rounded at the base, more or less scabrous and often with scattered hairs on the upper surface, the midrib and strong lateral nerves with appressed hairs beneath, 1½–3 in. long, 1–1½ in. broad; petiole ¼–⅓ in. long. Panicles with appressed hairs or glabrescent and scabrid. Pedicels shorter than or exceeding the lanceolate or ovate bracts, rarely over 3 lines, or flowers subsessile. Flowers 3–6 lines in diam. Sepals either nearly glabrous or with silky appressed hairs outside, silky within, usually ciliolate. Minute anther-cells usually distinctly separated by the apex of the connective, but variable. Ovaries glabrous or hairy. —*T. alnifolia,* DC. Syst. Veg. i. 401 (*non Willd.*).

Upper Guinea. Sierra Leone, *Don!* and others. Senegambia. Abbeokuta, *Irving!*

Var. *eriantha.* Flowers about ¼ in. diam. Sepals silky outside. Fernando Po, *Mann!*

2. **T. alnifolia,** *Willd. Sp. Pl.* ii. 1243 (*non DC.*). Branches smooth or obsoletely scabrous. Upper leaves broadly elliptical or obovate-elliptical, rounded or cuneate to the petiole below, rounded obtuse or obtusely pointed at the apex, entire or obscurely denticulate, glabrous glabrescent or with appressed hairs beneath, smooth or slightly scabrid, 3–6 in. long, 1½–

3½ in. broad. Petiole 4–10 lines, often slightly winged, glabrous or ciliate. Panicles glabrous or with loose or appressed deciduous hairs. Flowers 4–8 lines diam. Sepals glabrous thinly hairy or puberulous outside, glabrous usually within. Carpels glabrous or nearly so.—*T. senegalensis*, DC. Syst. Veg. i. 401. *T. obovata*, DC. l. c. *T. scabra*, Hook. f. Fl. Nigrit. 203.

Upper Guinea. Senegambia, *Whitfield!* Sierra Leone, *Afzelius!* and others; Brass, and near the Nun river, *T. Vogel! Barter!* Mouth of Niger and Fernando Po, *Mann!* etc.

Lower Guinea. Golongo Alto, Angola, *Dr. Welwitsch!*

Var. Leaves narrowed into the petiole (*T. rugosa*, G. et P. Fl. Seneg. 321). Senegal, *Perrottet!*

Through the courtesy of Dr. Garcke, I have had the opportunity of examining the original specimens of this plant in Willdenow's herbarium.

3. **T. Boiviniana,** *Baill. in Adans.* vii. 300. *t.* 7. An erect or ascending shrub of 2–3 ft. Leafy branches sparsely pilose, glabrescent below. Leaves obovate-lanceolate or -oblong; apex rounded, obtusely pointed or acute, narrowed at the base, denticulate or serrate, rugose, rather scabrous and with short scattered hairs above, tomentose beneath, with prominent lateral nerves, 3–5 in. long, 1½–2 in. broad. Petiole 4–8 lines. Peduncles and short pedicels pilose-tomentose. Flowers in few-flowered terminal cymes, 9–15 lines diam. Sepals slightly pilose within. Anthers ovate or ovate-oblong; cells nearly parallel or slightly divergent below. Carpels 3–4, glabrous, or densely hairy and glabrescent when ripe and about twice as long as the sepals.

Var. Carpels glabrous.

Lower Guinea. Pungo Andongo, *Dr. Welwitsch!*

Var. Carpels densely hirsute.

Mozamb. Distr. Rovuma river, *Drs. Kirk and Meller!* Zanzibar, *Dr. Kirk! Boivin.*

Order III. ANONACEÆ (by Prof. Oliver).

Sepals 3, distinct or more or less connate. Petals 6, in two series, or rarely 3, one series being suppressed, free or shortly connate at the base, valvate or imbricate in æstivation. Stamens indefinite, numerous (10 or fewer in *Clathrospermum*), free, usually closely imbricate upon a convex or rarely plane torus; filaments short or 0. Anthers adnate, linear, cuneate or quadrate, the connective usually produced, or truncate and dilated above the cells. Pistil of several or numerous free carpels, or syncarpous with a one-celled ovary (*Monodora*), or the ovaries cohering or separately imbedded in the fleshy torus (*Anona*). Stigmas capitate, sessile, or styles ovate oblong linear or subulate, usually sulcate and stigmatose at the apex or along the inner face. Ovules 1, 2, or more, basal and erect, or attached to the ventral suture in one or two series (in *Monodora*, parietal, indefinite). Fruit-carpels distinct, 1- or several-seeded, sessile or stipitate, usually indehiscent, or separately immersed in a pulpy or coriaceous fruit (*Anona*), or simply cohering (*Piptostigma*), or united into a globose or ovoid, many-seeded, woody or coriaceous capsule (*Monodora*). Seeds with a copious ruminated albumen, with or without an arillus. Embryo minute, near the hilum.—Trees or shrubs, sometimes climbing or scrambling. Leaves alternate, simple, entire,

exstipulate. Flowers axillary, terminal, or variously extra-axillary, solitary or fascicled, rarely cymosely racemose or panicled, sessile or pedicellate, hermaphrodite or rarely unisexual.

A large Order, confined to tropical and subtropical regions of both hemispheres. Of the 13 genera included in the Tropical African flora, 6 are peculiar, 6 are shared with Asia and the East, and but 2 (*Anona* and *Xylopia*) are common to Africa and America. From the numerous additions which have been recently made to this family from Tropical Africa, it is probable that there yet remain many new forms to be discovered which may materially modify the circumscription of the genera. Under the circumstances, I have preferred to leave a few species doubtfully assigned, rather than attempt a general and premature revision of the Order. I have left unnoticed here several specimens too imperfect for satisfactory description in the herbaria which I have examined.

Pistil syncarpous. Ovary 1-celled with indefinite parietal ovules.
  Outer petals usually wavy . . . . . 13. MONODORA.
Carpels indefinite, the ovaries connate or immersed in the torus, each with a solitary erect ovule . . . . . 1. ANONA.
Carpels 3 or more. Ovaries free.
  Petals 3, opposite to the sepals . . . . . 2. ENANTIA.
  Petals 6, or 3 alternate with the sepals.
    Inner petals much exceeding the outer . . . . . 3. PIPTOSTIGMA.
    Petals nearly equal or inner smaller.
      Inner petals imbricate in æstivation . . . . . 4. UVARIA.
      Inner petals valvate in æstivation, or very small and distinct.
        Calyx closed in bud, splitting across the top . . . . 5. CLEISTOCHLAMYS.
        Calyx 3-lobed, or of 3 free sepals.
          Stamens 10 or fewer . . . . . 6. CLATHROSPERMUM. / 7. (POLYALTHIA ♂.)
          Stamens indefinite, numerous.
            Petals connate at the base in a short ring . . . 8. HEXALOBUS.
            Petals free.
              Flowers upon sharply-hooked, woody peduncles. Petals nearly equal. Ovules geminate, erect . . 9. ARTABOTRYS.
              Flowers axillary. Inner petals shorter. Torus plane or concave in the centre. Styles connivent in an elongate cone . . . . . 10. XYLOPIA.
              Flowers axillary. Inner petals shorter, more or less connivent. Torus convex. Styles or sessile stigmas distinct. Ovules 1–3 . . . 11. OXYMITRA.
              Flowers extra-axillary. Inner petals shorter, connivent, thick and triquetrous above. Connective not dilated above the anther-cells. Ovules solitary . . . . . 11. OXYMITRA.
              Flowers terminal or extra-axillary. Inner petals not thickened. Connective dilated and globose or truncate above the anther-cells. Ovules 2–∞ . . . . . 12. UNONA. (See *Uvaria scabrida*.)
              Flowers extra-axillary, polygamous. Petals equal, narrow-linear. Ovules 1 or 2 . . . . . 7. POLYALTHIA.

1. ANONA, Linn.; Benth. and Hook. f. Gen. Pl. i. 27.

Flowers hermaphrodite. Sepals 3, usually small and valvate in æstivation, free or connate below. Petals 6, or the 3 inner suppressed; outer petals fleshy or thick and coriaceous, concave, at least at the base, spreading or con-

nivent, valvate in æstivation; inner petals, when present, valvate or imbricate towards their apices. Stamens indefinite, the connective more or less thickened beyond the anther-cells, ovate or truncate. Torus hemispherical or conical. Carpels indefinite. Ovaries connate or immersed. Styles and oblong stigmas free. Ovules solitary, erect. Fruit globose ovoid or cordate, multilocular, consisting of the mature one-seeded carpels imbedded in a pulpy or coriaceous matrix.—Trees or shrubs, Flowers solitary fascicled or rarely cymosely racemose, terminal or extra-axillary.

A large genus of which by far the larger number of species (about 50) are tropical American. One American species (*A. palustris*) appears to be truly native also in swamps of West Tropical Africa, and four other species of the New World, which are widely cultivated for the sake of their excellent fruit, often become naturalized. There are no species indigenous in continental Asia. A few very distinct species occur in Madagascar and Mauritius.

SECT. 1. **Attæ.**—*Petals* 3, *inner* 0 *or very minute.*

Leaves narrow-oval-oblong, acuminate acute or scarcely obtuse, often a little rough and the nerves minutely pubescent, or glabrescent below. Flowers 2–4 together. Fruit cordate or ovoid or ovoid-obtuse, faintly marked with nearly plane areolæ . . . . . 1. *A. reticulata.*

Leaves slightly acuminate, obtuse or acute, glabrous or glabrescent, more or less glaucous beneath. Flowers solitary or in pairs. Fruit ovoid-globose or rather conical, with prominent, convex, rhomboidal areolæ . . . . . 2. *A. squamosa.*

Leaves acute or rather obtuse, softly hoary, tomentose beneath, sparsely and shortly pilose above. Flowers solitary or in pairs. Fruit subovoid-cordate, with obtusely tubercled areolæ . . . . . 3. *A. Cherimolia.*

SECT. 2. **Guanabani.**—*Petals* 6, *inner conspicuous.*

* *Flowers solitary or in pairs. Pedicels naked or with* 1 *or more very small alternate bracteoles.*

Leaves obovate-oblong or oblong, shortly acuminate, soon glabrous. Inner petals broadly ovate-rotundate. Fruit ovoid or oblong-cordate. Areolæ with short ascending aculei . . . . . 4. *A. muricata.*

Leaves elliptical or ovate-oblong, acute or shortly acuminate, glabrous. Inner petals oblong. Fruit ovoid or subglobose. Areolæ at length nearly smooth and inconspicuous . . . . . 5. *A. palustris.*

Leaves broadly elliptical, ovate- or obovate-elliptical or oblong-elliptical, usually very obtuse, softly tomentose-pubescent, rarely sparsely pubescent, beneath. Inner petals oblong-triquetrous. Fruit nearly smooth, faintly areolate . . . . . 6. *A. senegalensis.*

Leaves oblong-elliptical, obtuse, glabrous, glaucous beneath. Sepals reflexed, acute. Petals ovate, glabrous . . . . . 7. *A. glauca.*

** *Flowers in racemose cymes. Pedicels with a pair of opposite, connate bracteoles, at first enclosing the bud.*

Leaves large, broadly elliptical-oblong or -obovate, abruptly acuminate. Petals ovate-elliptical, coriaceous, rigid . . . . . 8. *A. Mannii.*

See "Species imperfectly known," p. 17.

*1. **A. reticulata,** *Linn.; DC. Prod.* i. 85. Extremities rusty-pubescent. Leaves elongate-oval or -oblong, soon glabrous above. Pedicels 1 in. long more or less, from very short, extra-axillary or leaf-opposed peduncles. Sepals about 1 line long. Petals linear-oblong, rather obtuse, minutely puberulous outside, ½–1 in. long.—Bot. Mag. 2911–12.

Almost quite naturalized in Golungo Alto, Angola, *Dr. Welwitsch.*
An introduced W. Indian species. The Custard-apple.

*2. **A. squamosa,** *Linn.; DC. Prod.* i. 85. Extremities minutely pubescent or glabrous. Leaves oval-oblong. Flowers very similar to those of *A. reticulata.* Fruit greenish-yellow or rather glaucous.—Bot. Mag. 3095.

An introduced W. Indian species. The Sweet-sop.

*3. **A. Cherimolia,** *Mill.; DC. Prod.* i. 85. Extremities pubescent. Leaves membranous, elliptical or ovate-oblong. Petals lanceolate, acute, about ¾ in. long.—*A. tripetala,* Bot. Mag. 2011.

A native of Peru, cultivated for the sake of its fruit.

*4. **A. muricata,** *Linn.; DC. Prod.* i. 84. Extremities minutely pubescent or glabrous. Leaves rather coriaceous, 4–5 in. long, 1½–2 in. broad above the middle. Sepals triangular, rather acute, 2–3 lines long. Petals greenish-yellow, thick and coriaceous, three outer broadly subcordate-ovate, obtusely pointed, about 1½–1¾ in. broad, 3 inner slightly shorter, imbricate towards their obtuse apices, shortly clawed.

An introduced W. Indian species. The Sour-sop.

5. **A. palustris,** *Linn.; DC. Prod.* i. 84. Extremities glabrous or very nearly so. Leaves rather coriaceous, 3–5 in. long, 1½–2 in. broad; petiole 4–6 lines. Peduncles solitary, rather short. Three outer petals broadly ovate, rather obtuse, 3 inner rather smaller.—Bot. Mag. 4226. *A. chrysocarpa,* Guill. et Perr. Fl. Seneg. 6. The Alligator- or Monkey-apple of the West Indies, occurring also in Brazil.

Upper Guinea. Swamps, Grand Bassa Cove, *T. Vogel!* Senegambia, *Leprieur.*

6. **A. senegalensis,** *Pers.; DC. Prod.* i. 86. Varying much in size, sometimes a low shrub, from a few inches to 2 or 3 ft., sometimes a tree, attaining 20 ft. Extremities shortly rusty- or tawny-tomentose, pubescent or rarely glabrate. Leaves coriaceous; apex rounded or even retuse, sometimes rather pointed; base broadly rounded, obtuse or more rarely cuneate, glabrescent above, usually pale and more or less pubescent or tomentose beneath, veins connecting the lateral nerves subparallel; lamina from 2–5 in. in length, 1–2½ in. broad, sometimes 6–9 in. long on barren shoots; petiole 3–6 lines (sometimes 1 in.). Flowers usually solitary, pedunculate; peduncles ½–1½ in., spreading or decurved. Sepals broadly ovate, cuneate at the base, 1–2 lines long. Outer petals coriaceous, ovate (often broadly), rather obtuse, inner thick, oblong or oblong-lanceolate, triquetrous. Fruit erect or pendent, yellow or orange when ripe, 1¼ in. or more in diam., edible.—Dcless. Ic. i. t. 86. *A. arenaria,* Schum. et Thonn. Pl. Guin. 257.

Upper Guinea. Sierra Leone, *Don! Barter!* Niger, *Barter!*
North Central. Bornu, *E. Vogel!*
Nile Land. Sennar and Upper Nile (*Schweinf. et Asch. Enum.*).
Lower Guinea. Huilla, Benguella, *Dr. Welwitsch!* Congo, *Smith!*
Mozamb. Distr. Zambesi, *Dr. Kirk!* Rovuma river, *Dr. Meller!*

Var. *cuneata.* Base of the leaves more or less cuneate.—Golungo Alto, Angola, *Dr. Welwitsch!*

Var. *glabrescens*. Leaves elongate, elliptic-oblong, more or less narrowed at the base, sparsely pubescent beneath.—Pungo Andongo, Angola, *Dr. Welwitsch !*
Var. *latifolia*. Leaves 6 in. long and broad.—Madi, Upper Nile, *Speke and Grant !*

7. **A. glauca,** *Schum. et Thonn. Guin. Pl.* 259. A branching shrub of 2–4 ft.; branches and leaves glabrous. Leaves rigid, oblong-elliptical, obtuse, *narrowed at base, veiny, glaucous beneath*, 2–5 in. long, petiole very *short. Peduncles extra-axillary, usually solitary*, 1½ in., glabrous. Sepals reflexed, acute, glabrous. Petals ovate, rather acute, glabrous, 3 outer twice as large as the inner. Stigmas oblong, capitate.

Upper Guinea, *Thonning;* Senegambia, *Brunner* and others.
The above description is taken from Schumacher and Thonning.

8. **A. Mannii,** *Oliv. in Hook. Ic. Pl.* 1010. Extremities glabrous or nearly so. Leaves large, membranous or at length subcoriaceous, very shortly and rather abruptly acuminate; base rather narrow, very shortly cordate, subsessile or petiole scarcely exceeding 2 lines, glabrous, midrib and lateral nerves rather prominent below, the latter looped near the margin; venation obscure. Flowers 2–3 in. diam., extremely coriaceous, rusty-puberulous or pubescent, in strong, several-flowered, simple or forked racemose cymes, 6–10 in. long. Bracts coriaceous, rotundate, 3–4 lines long, opposed to the thick pedicels, which are ¾ in. or less long. Sepals broadly ovate, cuneate below, about ¾ in. long and broad. Petals minutely silky-puberulous, nearly equal, thick and almost woody in texture and firmness when dry, obtuse. Stamens very numerous; anthers extrorse, sessile, oblong-cuneate, the connective much thickened, truncate and rhomboidal above, puberulous, overhanging the cells. Carpels very numerous (several hundreds), closely crowded upon a large conical torus; ovaries wholly connate; style and stigma clavate, the latter puberulous.

Upper Guinea. Old Calabar river, *Mann !*

SPECIES IMPERFECTLY KNOWN.

9. **A. Barteri,** *Benth. Linn. Trans.* xxiii. 477. A glabrous tree attaining 50 ft. Leaves coriaceous, elongate-oval -oblong or -lanceolate, tapering to the apex from about the middle, base narrowed or cuneate; shining above; 6–8 in. long, 2–2½ in. broad; petioles 2 lines or less. Flowers not seen. Fruit as large as a peach, hoary, the areolæ prominent, rounded or minutely apiculate, on a peduncle of 1 in. or less.

Upper Guinea. Niger, *Barter !*

"*Anona ?*" regarded by Mr. Bentham as near the above (l. c.). Leaves elongate, oval-oblong, finely acuminate, glabrous. The single bud is axillary, on a pedicel of about 1 in. Sepals rusty-tomentose, broadly ovate, pointed, upwards of ¼ in. long.
Upper Guinea. Gaboon river, *Mann !*

Dr. Kirk sent specimens in fruit from the Rovuma and Zambesi district of what may prove a new *Anona*.

2. **ENANTIA,** Oliv. in Journ. Linn. Soc. ix. 174.

Flowers hermaphrodite. Sepals 3, free, lanceolate, valvate in æstivation. Outer petals 0; inner petals 3 (opposite to the sepals), much exceeding the sepals, thick, coriaceous, ovate-lanceolate or elliptical, plane or the margins

slightly reflexed from the thickened or obtusely-keeled centre; base narrower, concave, erect or slightly spreading. Stamens indefinite; anthers linear-oblong, extrorse, subsessile; connective produced into a short very obtuse tip, scarcely dilated. Torus convex. Carpels free, indefinite, closely packed; ovary pilose; stigma shorter than the ovary, linear-oblong, sulcate on the inner face, pilose; ovules solitary, erect. Fruit not seen.

A tree, with rather large membranous leaves, and solitary, shortly peduncled extra-axillary flowers.

I have based this new genus upon the single species described below, which differs from all known *Anonaceæ* in the total suppression of the outer petals. Excepting in this particular (and the free ovaries) the flowers resemble those of an *Anona*, in which genus, however, the tendency is to suppression of the inner series of petals. Technically it is allied to the *Phæanthecæ*.

1. **E. chlorantha,** *Oliv. l. c.* Ultimate branchlets slender, pubescent. Leaves membranous, obovate- or oblanceolate-oblong, shortly acuminate, cuneate or scarcely rounded at the base, glabrous excepting the puberulous midrib above and petioles, 5–10 in. long, 2–3½ in. broad; petiole 1½–3 lines. Flowers solitary, extra-axillary, on peduncles of about half an inch, with 1 or 2 lanceolate or ovate-lanceolate sepal-like bracts above the middle, appressed-pilose externally. Sepals lanceolate, subacute, 6–8 lines long, strigose-pilose outside, dark and glabrate within, spreading or reflexed. Inner petals 1–1½ in. long, 6–8 lines broad, rather obtuse, with closely appressed minute hairs externally.

Upper Guinea. Old Calabar, *Thomson!*

3. PIPTOSTIGMA, Oliv. in Journ. Linn. Soc. viii. 158.

Flowers hermaphrodite. Sepals 3, ovate or lanceolate, acute, free. Petals 6, free, in two series, valvate in æstivation; outer petals sepaloid, but slightly exceeding the sepals; inner petals much longer than the outer, rather thin, plane or the margins reflexed; the base concave, surrounding the genitalia. Stamens indefinite, closely imbricate upon a hemispherical torus; anthers sessile, cuneate-oblong, extrorse, the connective truncate, transversely rhomboidal. Carpels 4–6, united at the apex in a sessile, depressed-globose, obscurely-lobed, pilose, deciduous stigma; ovules 6–10, in 1 or 2 series upon the ventral suture. Fruit not seen (said to consist in one species of united carpels).

Trees, with subsessile leaves, with numerous secondary nerves and obscure transversely parallel venation, and simple or panicled cymose racemes, from wood of a previous year.

The two following species are all that are known of this genus, which is confined to West Tropical Africa.

Leaves sparsely pilose beneath, abruptly cuspidate. Racemes elongate, simple or forked. Bracts linear-lanceolate. Outer petals linear-lanceolate or lanceolate . . . . . 1. *P. pilosum.*

Leaves glabrous or glabrate, shortly acuminate. Panicles dichotomous. Bracts ovate, acute. Outer petals ovate or ovate-lanceolate . . . 2. *P. glabrescens.*

1. **P. pilosum,** *Oliv. l. c.* Extremities softly tomentose with ferruginous hairs. Leaves membranous, subsessile, obovate-oblong, shortly apiculate, rounded at the base, glabrous above, more or less pilose beneath espe-

cially on the midrib and veins, 10–14 in. long, 5–6 in. broad above the middle. Racemes probably pendulous, slender, 6 in. to 2 ft. long, once or twice forked, bearing a few flowers at the pilose or villous extremities of its branches. Bracts 5–8 lines, like the short stout pedicels rusty-villous. Sepals ovate-lanceolate, 3–5 lines long, villous externally. Outer petals ½ in. long, resembling the sepals; inner petals very fragile when dry, imperfect in our specimens, probably 1½–2 in. long, furrowed or striate, pilose externally. Ovaries hirsute; ovules about 8, uni- or subbiseriate. "Fruit of several united carpels. Seeds in two rows, covered with a little pulp."

Upper Guinea. Old Calabar, *Thomson!*

2. **P. glabrescens,** *Oliv. l. c.* A tree of 30 feet; twigs at first pilose. Leaves oblanceolate or oblanceolate-oblong, shortly acuminate; base obtuse or acute, glabrous above, glabrescent and somewhat glaucous beneath, with numerous secondary nerves, 4–8 in. long, 1½–2½ in. broad, subsessile or petiole rarely over 3 lines. Flowers (drooping?) in rigid, forked or panicled, cymose, probably erect racemes. Pedicels 3–6 lines, bearing an ovate, acute bract, rusty-pilose. Sepals triangular-ovate, about 1½ lines long. Outer petals 3 lines long, like the sepals rusty-pilose externally; inner petals considerably longer, ¾–1 in. long, ovate-lanceolate or oblong, acute, pubescent. Carpels about 4. Ovules 6–10, in two series. Fruit not seen.

Upper Guinea. Kongui river, *Mann!*

4. UVARIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 23.

Flowers hermaphrodite. Sepals 3, free or united more or less towards the base, valvate in æstivation, or calyx at first cupulate, nearly entire. Petals 6, rotundate elliptical or ovate, in 2 series of 3 each, flattened and spreading in flower or concave, sometimes united at the base, more or less imbricate in æstivation. Stamens indefinite, closely crowded, the connective shortly produced beyond the anther-cells into a truncate or rounded tip. Torus more or less prominent, truncate or slightly depressed in the centre. Carpels numerous, linear, clavate or oblong. Style truncate. Ovules numerous or few, generally biseriate. Fruit-carpels distinct, sessile or stipitate, several-seeded or 1-seeded by abortion.

Scrambling or climbing shrubs or small trees, with more or less of a stellate tomentum or glabrous. Flowers solitary or fascicled, often extra-axillary or leaf-opposed, sometimes from the wood of a previous year.

A genus, confined to the tropics or subtropical regions of Asia, Africa, and Australia. None of the species has been satisfactorily shown to be common to the two continents. One species, *Uvaria caffra*, grows at Natal.

Leaves large, 9–15 in. or more.
- Sepals free or nearly so, shorter than the petals before expansion . . 1. *U. connivens.*
- Sepals large, enclosing the petals until expansion, connate at the base, surrounded by large, concave, imbricate bracts, rusty silky-pilose externally . . . . . 2. *U. fusca.*

Leaves rarely exceeding 8 in. (usually 2–5 in.).
- Leaves 1 in., ovate, acute, glabrous above, at first tomentose beneath. Calyx? Petals oval-oblong . . . . . 3. *U. ovata.*
- Sepals free above the middle or nearly to the base.
  - Leaves shortly scabrous-hispid above, more or less rounded at

the base. Flowers 1–2 in. across. Sepals ovate or ovate-lanceolate, nearly free . . . . . 4. *U.? scabrida.*
Leaves stellate-pubescent beneath, acuminate; base subcordate. Flowers ½ in. or less. Sepals ovate, connate below . . . 5. *U. acuminata.*
Leaves glabrous, oblong-elliptical. Peduncles subternate, 3–4 lines long. Sepals orbiculate . . . . . 6. *U. lucida.*
Leaves oval-oblong, acute or obtuse, base subcordate; at first pilose. Flowers subsessile. Petals lanceolate. Fruit-carpels ovoid, nearly sessile . . . . . 7. *U. cordata.*
Leaves oval-oblong, sparsely pilose below. Flowers subsessile. Fruit-carpels subglobose, nearly sessile . . . . . 8. *U. globosa.*
Leaves glabrous, oblanceolate, acuminate, emarginate at base. Fruit-carpels on stipes of ¾ in. . . . . 9. *U. gracilis.*
Sepals connate, forming a cupuliform calyx, with entire or 3-toothed margin, splitting on expansion. Petals spreading.
Leaves more or less coriaceous. Anthers truncate . . . . 10. *U. Chamæ.*
Leaves firmly membranous. Anther-tips compressed, not truncate . . . . . 11. *U. angolensis.*

IMPERFECTLY KNOWN SPECIES.

Leaves glabrous and shining above, cuspidate, 4–7 in. Flowers subsessile on wood of previous year . . . . . 12. *U? sp.*
Leaves oblanceolate-oval or -oblong, glabrous. Fruit-carpels very numerous, on long stipes, 2–1-seeded . . . . . 13. *U. sp. nov?*
Leaves ovate-elliptical, obtusely acuminate, glabrous, excepting midrib above. Carpels tomentose, transversely crested . . . . . 14. *U. cristata.*

1. **U. connivens,** *Benth. in Linn. Trans.* xxiii. 465. A tree of 30–40 ft., glabrous or with the extremities obsoletely puberulous. Leaves large, elongate oblanceolate-oblong, narrowed to the obtuse or narrowly-cordate base, cuspidate or sharply acuminate, glabrous, usually 9–15 in. long, 2½–4½ in. broad. Petioles very short and thick, 2–4 lines. Flowers ¾–1 in. diam., nearly glabrous or thinly sericeous, on very short bracteate axillary peduncles; bracts deciduous. Sepals free, very broadly rotundate-ovate, shortly pointed, more or less imbricate at the base. Petals thick, purplish, connivent, outer ones nearly as broad as long, much exceeding the sepals and slightly imbricate below. Anthers very numerous, linear, truncate, and slightly capitate. Carpels numerous, shortly pubescent, upon the slightly excavated centre of the raised torus. Ovules 12 18, biseriate. The fruit has not been satisfactorily identified.

Upper Guinea. Ambas Bay and Fernando Po, *Mann!*

2. **U. fusca,** *Benth. in Linn. Trans.* xxiii. 466. A glabrous tree, attaining 25 ft. Leaves large, elongate-oblanceolate, scarcely acute, glabrous, 9–14 in. long, 3–4 in. broad. Petioles 4–5 lines, thick. Flowers solitary or 2 or 3 together, subsessile, shortly silky-pilose with appressed rusty hairs, about 1 in. diam. Sepals connate below, very large and broadly rotundate, concave, imbricate, glabrous inside, surrounded by several rather large concave, imbricate, sepal-like bracts. Petals concave, slightly imbricate, shorter than the sepals, at least just before expansion. Stamens 2000 or more, very closely packed. Anthers truncate. Carpels very numerous, villous. Ovules few. Fruit unknown.

Upper Guinea. Fernando Po, *Mann!*

3. **U. ovata,** *A. DC. Mém. Anon.* 29. Young branches subtomentose with rusty hairs. Leaves ovate, acute, glabrous above, lower surface at first rusty-tomentose, at length glabrate excepting the midrib, 1 in. long. Peduncles leaf-opposed, very short, 2-flowered. Petals subequal, oval-oblong, rather acute.—*Unona ovata,* DC. Syst. Veg. i. 489.

Upper Guinea, *Vahl.*
Unknown to me excepting from the description.

4. **U.? scabrida,** *Oliv.* A somewhat climbing shrub or small tree of 30 ft., with the young twigs rusty-tomentose and rather rough with crowded stellate hairs. Leaves oblong or slightly narrowed towards the more or less rounded base, obtuse or shortly and obtusely acuminate, scabrid with very short stiff hairs, distinctly stellate on the under surface, 4–6 in. long, 1½–2 in. broad. Petioles 1–2 lines. Flowers 1½–2 in. across, on extra-axillary peduncles, ¼–1 in. long. Sepals ovate or ovate-lanceolate, rather acute, nearly or quite free, reflexed or spreading. Petals yellowish-green, ovate or ovate-elliptical, scarcely acute, rough, like the sepals, with rusty, short, stellate tomentum. Carpels indefinite, each with 4–6 ovules in two rows, stellate-hairy. Fruit carpels rough, tomentose, forming a globose cluster (according to the Rev. W. C. Thomson).

Upper Guinea. Camaroons river, *Mann!* Ikoneto, Old Calabar, *Thomson!*
I am not sure if the æstivation of the loosely-packed petals be imbricate, but from the general aspect of the plant and its stellate hairs, I leave it provisionally in *Uvaria.*

5. **U. acuminata,** *Oliv.* A climbing shrub with the young shoots pubescent or pilose-tomentose with cinnamon or rusty hairs. Leaves oval-oblong, narrowed above into an acute or rather obtuse acumen, slightly or not at all narrowed to the cordate or subcordate base, rather paler and stellate-pubescent beneath, the midrib with more or less spreading hairs, more or less puberulous or subscaberulous or glabrate above, 2–4 in. long, ¾–1½ in. broad. Pedicel about 1 line. Flowers (not seen in the continental specimens) rather small, solitary, on peduncles of 1 in. or less. Sepals connate below, ovate, rather pointed, stellate-pubescent. Fruit-carpels globose or shortly oblong, rugose-puberulous, stipitate, obtuse, light brown, 4–5 lines diam., 4–6 lines long, few- or 1-seeded. Stipes about 2 lines. Seeds shining, 4 lines long, 2–2½ lines broad.

Mozamb. Distr. Rovuma river, *Dr. Kirk!*
Also Madagascar, *Bojer!* The ripe fruit is said to be eaten.

6. **U. lucida,** *Benth. in Linn. Trans.* xxiii. 465. Glabrous. Leaves oblong-elliptical, shortly and obtusely acuminate, broadly rounded at the base, about 3–3½ in. long, 1½–1¾ in. broad. Petiole 2 lines. Peduncles subternate, 3–4 lines long, bracteate. Flowers covered with a very short, rather hoary tomentum. Sepals rotundate. Petals free, rounded, about 5 lines long and broad. Anthers shortly produced into an obtuse trigonous or compressed, rather obovate tip. Carpels more or less hairy above. Styles short, thick, truncate. Ovules 5–8.—*Guatteria lucida,* Boj. Hort. Maurit. 6; *Unona lucida,* Sweet, Hort. Brit. (*fide* Boj.)

Mozamb. Distr. Mombase Island, *Bojer!*

7. **U. cordata,** *Schum. et Thonn. Guin. Pl.* 255. A much-branched shrub, extremities rusty-tomentose. Leaves somewhat coriaceous, oval-oblong, from a subcordate base, slightly acuminate acute or rather obtuse, shining above, paler beneath, at first silky, at length with pubescent midrib and margin, 2–3 in. long. Peduncles very short, leaf-opposed, solitary, tomentose, usually 1-flowered. Sepals concave, obtuse. Petals 6, three times longer than the sepals, equal, lanceolate, spreading or recurved. Fruit-carpels very shortly pedicellate, subcapitate, about the size of a gooseberry, ovate, ochreous-tomentose, 6–8-seeded.

Upper Guinea, *Thonning.*
I have not seen an authentic specimen. The description is from S. and T.

8. **U. globosa,** *Hook. f. Fl. Nigrit.* 210. Branches slender, the extremities rusty-pilose. Leaves oval-oblong obtuse or shortly and obtusely acuminate, rounded at the base, soon glabrous above except on the midrib, sparsely hairy below, 2–3 in. long, ¾–1 in. broad. Petioles 1–2 lines. Flowers small, solitary or in pairs, very shortly stalked or subsessile, silky with ferruginous hairs. Sepals connate below. Petals much imbricate in bud, at length spreading. Fruit-carpels rusty-tomentose, nearly globose, subsessile, 3–5 lines diam., few-seeded. Seeds shining, compressed.

Upper Guinea. Accra, *T. Vogel!*
The specimens are imperfect and I have not myself examined a flower. I take it to be very nearly allied to *U. cordata,* if indeed distinct.

9. **U. gracilis,** *Hook. f. Fl. Nigrit.* 210. Glabrous, excepting the pubescent extremities. Leaves somewhat membranous, oblanceolate, obtusely acuminate, narrowed to the base, which is narrowly and obscurely cordate or emarginate, glaucous beneath, about 3 in. long, 1¼ in. broad. Petiole 2 lines. Peduncles axillary, solitary, of fruit 1 in. long. Sepals obovate, obtuse, ¼ in. long. Fruit-carpels glabrous, small, spreading, on stipes of ¾ in.

Upper Guinea. Sierra Leone, *Don!*
Mr. Bentham suggests that this plant may be a *Clathrospermum.* I have not had the opportunity of analysing a flower.

10. **U. Chamæ,** *P. de Beauv. Fl. Ow. et Ben.* ii. 42. *t.* 83. A small tree, with the young branches smooth and glabrous or rusty-pubescent at first. Leaves coriaceous, elliptical oblong or oval, obtuse or very shortly and obtusely pointed, shortly petiolate, at first with very minute, scattered, stellate hairs at length glabrous or with minute hairs on the midrib, from 2–5 in. long, 1–2½ in. broad. Petioles 1–2 lines. Flowers 1 in. or rather more in diam., 2 to 5 together or solitary, greenish-brown, densely puberulous excepting towards the lower part of the inner face of the petals. Peduncles shorter than the flower. Petals spreading, obovate or elliptical. Anthers truncate. Carpels rusty-pubescent, with the stigma transversely dilated on the outer side. Fruit-carpels 20 or fewer, rusty-tomentose, oblong or roundish, terete, on stipes of 3–5 lines, sometimes rough, with a few projecting points, ½–1 in. long. Seeds few, more or less compressed, shining, pale brown when dry, with a slight thickening at the hilum, about 4 lines long and 2 lines broad.—Rich. in Fl. Seneg. 7. t. 3. fig. 2. *Unona macrocarpa,*

DC. Syst. Veg. i. 489. *Uvaria cylindrica*, Schum. et Thonn. Guin. Pl. 256 (*ex descr.*).

Upper Guinea. Senegambia! *Leprieur, Heudelot*, etc.; Gold Coast, *P. de Beauvois.* Nupe, on the Niger, *Barter!*

I have not had the opportunity of examining the calyx of a bud, but from the appearance of the calyx-segments after expansion, I think it probable that it is cupulate at first, then splitting two-thirds or more to the base into broad ovate or quadrate segments, as *in U. angolensis*. Indeed, Richard (Fl. Seneg.) describes the calyx as "urceolate-globose, with an obsoletely tridentate mouth." Mr. Bentham (Linn. Trans. xxiii. 464) describes the sepals as united at the base or to the middle, but no doubt from the examination of expanded flowers.

11. **U. angolensis,** *Welw. mss.* A small tree of 6–10 ft. or a tall climber. Extremities pubescent or pilose-pubescent. Leaves firmly membranous, obovate-elliptical or broadly oblong-elliptical, usually shortly obtusely or acutely pointed, rounded or obtuse at the base, glabrate above, obsoletely or minutely pubescent, especially on the midrib beneath; midrib and lateral nerves rather prominent below; 2½–6 in. long (usually 2½–4 in.), 1–2½ in. broad. Petiole 1½–3 lines. Flowers terminal or lateral extra-axillary, solitary or in pairs, sessile or subsessile, about 1 in. across or rather less. Calyx deeply cupulate, undulate or nearly entire at first, about 5 lines broad, at length splitting on expansion. Petals nearly equal, spreading, elliptical, imbricate in æstivation; anthers sessile, linear, the connective prolonged into an ovate-oblong ovate or ovate-lanceolate, usually obtuse compressed not dilated or truncate tip. Carpels ∞, closely crowded; ovaries linear-pubescent; stigma sessile, capitate, glabrous; ovules numerous. Fruit-carpels stipitate oblong-cylindrical or nodulose, minutely rusty-tomentose, few- to many-seeded, ½–1½ in. long, ⅓–¾ in. broad; stipes about ½ in.

Lower Guinea. Pungo Andongo, Angola, *Dr. Welwitsch!*

Resembling *U. Chamæ*, but apparently readily distinguishable by the connective of the anthers.

12. **U. ? sp.** A glabrous shrub of 15–20 ft., the tips of the branches with a few hairs at first. Leaves coriaceous, oval or oblanceolate, cuspidate, glabrous on both surfaces, rather shining above, the midrib and lateral nerves rather prominent beneath, 4–7 in. long, 1½–2½ in. broad. Flowers subsessile, on wood of a previous year. Petals white, with purplish spots at the base inside (*Mann*).

Upper Guinea. Fernando Po, *Mann!*

Probably a new species of this genus, but I have seen only a single imperfect specimen.

13. **U. sp. nova ?** A shrub of 6–10 ft., sometimes scandent. Extremities glabrous. Leaves rather coriaceous, elongate oblanceolate-oval or -oblong, shortly pointed glabrous or on first expansion minutely puberulous, especially upon the margin; venation rather obscure, 3–7 in. long, 1–2 in. broad. Petiole 1–2 lines. Fruits solitary, terminating lateral peduncles of ½–1½ in. Carpels very numerous, 2- or 1-seeded, ellipsoidal or subglobose, about ½ in. long or less, on long radiating stipes of 1½ in.

Lower Guinea. Pungo Andongo and Cazenga, Angola, *Dr. Welwitsch!*

Flowers not seen.

14. **U. cristata,** *R. Br. mss. in Herb. Mus. Brit.* Extremities and mid-

rib of leaves above minutely puberulous. Leaves (bronze-brown when dry) ovate-oblong to elliptic-oblong, obtusely acuminate, more or less rounded at base; margin subcrispate-undulate; midrib prominent beneath; reticulation obscure, 4½–5½ in. long, 1¾–2¼ in. broad; petiole 1½–2 lines. Flower? Fruit on a short, stout, lateral peduncle, ½ in. long; carpels 1½ in. long, ½–¾ in. diam., closely rusty-tomentose, transversely cristate, obtuse, on stipes ¼ in. long.

Upper Guinea. Sierra Leone, *Purdie!*

A specimen in flower, from Cape Coast, in the British Museum herbarium may belong to the same species. The calyx is 3-fid, with rotundate lobes.

5. CLEISTOCHLAMYS, Oliv. in Journ. Linn. Soc. ix. 175.

Flowers hermaphrodite. Calyx closed in bud (sepals connate), splitting across the apex into 2 or 3 unequal or equal valves. Petals 6 (seen only in unexpanded flowers); 3 outer ovate, valvate in æstivation, 3 inner rather smaller, imbricate in æstivation. Stamens indefinite (about 30); anthers sessile or subsessile, cuneate-quadrate, extrorse; the connective slightly dilated and truncate beyond the cells. Torus slightly convex. Carpels free, 6–8; ovary glabrous or nearly so, narrowed above into a short linear-oblong recurved stigma; ovules solitary, erect. Fruit-carpels oblong, obtuse, stipitate.

A glabrous shrub. Leaves rather narrow obovate-oblong or oblong, penninerved. Flowers very small, axillary, sessile.

This plant was placed, with doubt, in the genus *Popowia*, by Mr. Bentham (Linn. Trans. xxiii. 470), who, however, had not seen flowering specimens. These have been since supplied by Dr. Kirk. The salient characters of the genus are, the connate sepals forming a calyx, at first closed; the imbricate inner petals, which, with the truncate stamens, place it in the tribe *Uvarieæ*, and the very small, usually solitary, axillary flowers.

1. **C. Kirkii,** *Oliv. l. c.* Much branched and entirely glabrous. Leaves firmly membranous or rather coriaceous, oblanceolate-oblong or oblong, obtuse rounded or rather acute at the apex; base obtuse; lateral veins numerous, anastomosing; size very various, usually from 1½–4 in. long, ½–1½ in. broad; petiole 1 2 lines. Flowers very small (only seen in bud, about 1–1½ lines diam.), with a few minute, imbricate, rotundate, scaly bracts. Calyx glabrous, smooth, thinly coriaceous. Fruit-carpels black, edible when ripe, oblong, very obtuse or mucronulate, glabrous, 6–8 lines long, 3–4 lines diam., on stipes of 2 3 lines, 1-seeded.—*Popowia? Kirkii*, Benth. in Linn. Trans. xxiii. 170.

Mozamb. Distr. Foot of Moramballa; near Tette; near Senna, Zambesia, *Dr. Kirk!*

6. CLATHROSPERMUM, Planch.; Benth. et Hook. f. Gen. Pl. i. 29.

Flowers hermaphrodite or unisexual. Sepals 3, minute, ovate or rotundate. Petals 6, in two series, valvate in æstivation, concave, thick; inner rather smaller or very minute. Stamens 10 or fewer; anthers subsessile or on short thick filaments, extrorse with parallel cells, obtuse, the connective not produced above, but in one species much produced behind the cells. Carpels 6–8 in the ♂, indefinite in the ♀, free; ovary pilose; stigma linear,

oblong or globose; ovules 5 or fewer, in one series. Fruit-carpels stipitate, 1–3-seeded.

Climbing shrubs, with membranous or rather coriaceous leaves; the venation more or less transversely parallel. Flowers very small, axillary, on simple forked or paniculate peduncles or from the old wood.

Notwithstanding the important differences between the two following species, I feel but little hesitation in referring them to the same genus. To adopt the alternative of creating a new genus for *C. Mannii*, with our present imperfect knowledge of the family, would be premature.

Flowers hermaphrodite. Inner petals nearly equalling the outer. Anthers dilated behind the cells . . . . . 1. *C. Vogelii.*
Flowers unisexual. Inner petals minute. Anthers not dilated behind the cells . . . . . 2. *C. Mannii.*

1. **C. Vogelii,** *Planch.; Benth. in Linn. Trans.* xxiii. 479. A climbing shrub, with slender branchlets, minutely rusty-sericeous at first or glabrous. Leaves thinly coriaceous, obovate- or elliptical-oblong, shortly acuminate or obtuse, glabrescent, glaucescent or reddish-glaucescent beneath, 3–6 in. long, 1–2 in. broad; petiole 1–2 lines. Flowers very small, on slender axillary pedicels, ½–1 in. long, at first with a minute bracteole near the middle. Sepals ovate-rotundate, slightly connate, ½–¾ line long. Petals puberulous; outer broadly elliptical, scarcely 2 lines broad; base incurved; inner obovate-cuneate, with a thick claw. Stamens about 9–10; anthers extrorse, with very short parallel cells; connective not produced above, but dilated behind the cells into a triangular appendage. Carpels 6–8; ovary shortly pilose; style linear, obtuse, glabrous, minutely notched or sulcate at top; ovules about 3 superposed. Fruit-carpels 1–3-seeded, ⅓–1½ in. long, narrowed between the seeds, glabrous, on stipes of 1–5 lines.—*Uvaria? Vogelii*, Hook. f. Fl. Nig. 208. t. 17.

Upper Guinea. On the Quorra, *T. Vogel!* Sierra Leone, and Nupe and Onitscha on the Niger, *Barter!* Bagroo river, *Mann!*

2. **C. Mannii,** *Oliv.* A climbing shrub, attaining 50 ft.; the extremities rusty-pubescent or shortly pilose at first. Leaves membranous, obovate-oblong, shortly and rather abruptly acuminate, glabrous above unless on the nerves, more or less pubescent or at length glabrate beneath; midrib and parallel lateral nerves prominent below, 5–8 in. long, 1¾–3 in. broad. Flowers fascicled, on simple or forked peduncles or in fasciculate panicles, often from the axils of fallen leaves; the peduncles sometimes repeatedly forked and very numerous, with minute bracts, forming large clusters from knotted portions of the old wood; ♀ 2–3 lines diam., ♂ rather smaller, depressed-globose. Sepals ovate, ½–¾ line long. Outer petals deeply concave, as broad as long, very thick towards the apex, about 2 lines broad, puberulous. Inner petals oblong-cuneate, obtuse, equalling or shorter than the carpels. Male fl.: Stamens about 7, diverging from the centre, surrounded by numerous very minute gland-like staminodia; anthers oblong, obtuse, connective not produced; carpels 0. Female fl.: Carpels numerous (about 60); ovaries pilose; stigma sessile, globose or rounded-oblong, sulcate, glabrous; ovules 5, uniseriate. Fruit not seen.

Upper Guinea. Gaboon river (males only), *Mann!* Kongui river, *Mann!* and Old Calabar (females only), *Thomson!*

7. POLYALTHIA, Blume; Benth. et Hook. f. Gen. Pl. i. 25.

Flowers hermaphrodite or polygamo-dioecious. Sepals 3, free or connate below, valvate or slightly imbricate in æstivation. Petals 6, equal or subequal, valvate in two series in æstivation, ovate or linear. Stamens indefinite (in the following polygamous species about 5 in the hermaphrodite), linear or cuneate, connective dilated and thickened beyond the cells or (in the African species) shortly produced and compressed. Carpels indefinite (wanting in the ♂ of the African species). Stigma oblong or capitate. Ovules 1 or 2, usually erect (attached to the ventral suture in the African species). Fruit-carpels stipitate, globose or oblong, 1-seeded.—Trees or shrubs. Flowers solitary or fascicled, axillary or extra-axillary.

A considerable genus of the Indian continent and Archipelago, with an Australian outlier. The species here described does not accord well with the genus, nor yet with *Unona*, with which its ventral (and superposed, when geminate) ovules ally it. It would be premature, however, with our present imperfect knowledge of African *Anonaceæ*, either to create a new genus for it or to definitively modify the characters of any existing genus in order to include it.

1. **P.? acuminata,** *Oliv.* A small tree, with glabrous slender twigs or the tips at first sparsely pubescent. Leaves thinly coriaceous, oval-oblong or oval, narrowed into a rather long acumen, narrowed cuneate or slightly rounded at the base, glabrous, 4–7 in. long, 1¼–2 in. broad; petiole about 1 line. Peduncles very short or nearly ¼ in., leaf-opposed or variously extra-axillary, bearing 1–3 pedicellate polygamo-dioecious flowers; pedicels about ¼ in., with minute, rotundate, clasping bracts at or near the middle. Sepals more or less connate below, rotundate, obtuse, minutely pubescent, nearly 1 line long and broad. Petals equal, erect or ascending, open, narrow-linear, obtuse, plane; the margins often involute near the middle, puberulous, ½ in. long. Male fl.: Stamens 14–18; anthers nearly sessile, linear; the connective shortly produced into a compressed obtuse tip. Torus convex. Carpels 0. Female fl.: Stamens about 5, obtuse or pointed. Carpels densely crowded, 10–12, nearly glabrous; ovary linear or clavate, with a sessile globose stigma. Ovules solitary or geminate, attached to the ventral suture. Fruit-carpels (not seen ripe), stipitate, globose, 1-seeded.

Upper Guinea. Bagroo river, *Mann!* Old Calabar, *Thomson!*

In the Kew herbarium there is a specimen of *P. (Guatteria) Korinti* (Dun.), labelled *Guatteria lucida*, Boj., as from Mombase Island, off the coast of E. Tropical Africa, but Mr. Bentham is of opinion that the label has been misplaced, and that it belongs to the *Uvaria lucida*, described at page 21.

8. HEXALOBUS, A. DC.; Benth. et Hook. f. Gen. Pl. i. 24.

Flowers hermaphrodite. Sepals 3, ovate, coriaceous, valvate in æstivation. Petals 6, elongate, narrow, connate at the base into a short tube, valvate (?) in two series and transversely folded in æstivation. Stamens indefinite; anthers linear or linear-cuneate; connective thickened and truncate or scarcely produced beyond the cells; filaments short. Torus more or less convex or truncate. Carpels 3–12; stigma 2-lobed; ovules numerous, 2–1-seriate. Fruit-carpels oblong or ellipsoidal, sometimes slightly constricted, sessile in the continental species.

Trees or shrubs, glabrous or pubescent, with axillary, solitary or fascicled, sessile or pedicellate flowers.

A small genus, of which the only species described belong to Africa and Madagascar.

Leaves glabrous, acuminate. Flowers on distinct pedicels, bearing a pair of connate deciduous bracts . . . . . 1. *H. grandiflorus.*
Leaves more or less softly pubescent, at least on the under surface, obtuse or acute. Flowers sessile or subsessile . . . . . 2. *H. senegalensis.*

1. **H. grandiflorus,** *Benth. in Linn. Trans.* xxiii. 468. *t.* 49. A tree, attaining 60 ft., with the extremities glabrous, or at first sparsely pilose. Leaves narrow-oval or oblanceolate, acuminate, thinly coriaceous, glabrous or with very thinly scattered hairs beneath, the midrib glabrous or puberulous; 4–9 in. long, 1¾–2 in. broad; petiole 2–4 lines. Flowers solitary or in pairs, on peduncles of ¼–½ in., bearing a narrow leaf-bud and a pair of rusty-sericeous connate bracts. Sepals ovate, concave, thick and almost woody in texture, 4–6 lines long. Petals whitish, subequal, linear-lanceolate, transversely plicate, silky-pubescent, 1½ in. or more in length. Anthers linear, sometimes elongate, the connective obtuse or truncate, scarcely prolonged beyond the cells; filament much shorter than the anther. Carpels 10–12; ovary densely pilose; stigmas short, reflexed, 2-lobed; ovules numerous, 2-seriate. (Fruit-carpels 3–6, sessile, about 3 in. long, 1½ in. thick, rusty-pubescent-tomentose, rounded at the apex, with numerous seeds, transversely packed, extending from side to side. It is not quite certain that the fruit here described belongs to the same species.)

Upper Guinea. Ambas Bay, *Mann!* and Old Calabar, *Thomson!*
The fruiting specimen described above was collected by Mr. Barter on the Niger.

2. **H. senegalensis,** *A. DC. Mém. Anon.* 37. A small tree, the extremities pubescent or tomentose. Leaves oblong or narrowly oval, obtuse or narrowed to an acute or subacute apex, rounded or obtuse at the base, shortly pilose or pubescent, at length glabrescent above, usually softly pubescent beneath, the larger 4–5 in. long, 1–1½ in. broad, subsessile or petiole scarcely exceeding 1 line. Flowers cream-coloured, axillary, solitary or 2 or 3 together, with 2 or 3 deciduous concave bracts. Sepals ovate, pubescent or pilose-silky. Petals narrow-lanceolate, tapering to the apex (in Niger specimens ¾–1 in. long). Anthers linear; connective slightly transversely dilated, rounded or truncate; filaments short. Carpels 4–6. Fruit-carpels sessile or subsessile, in our specimens 1–1½ in. long, ½–1 in. thick, terete or slightly constricted, the transverse seeds separated by thin layers of the endocarp.—*Uvaria monopetala,* Guill. et Perr. Fl. Seneg. 8. t. 2.

Upper Guinea. Senegambia, *Leprieur and Perrottet, Heudelot;* Gambia, *Whitfield!* Nupe, Niger, *Barter!*
Nile Land. Upper Nile (*Schweinf. et Asch. Enum.*); Madi, *Speke and Grant!*

9. **ARTABOTRYS,** R. Br.; Benth. et Hook. f. Gen. Pl. i. 24.

Flowers hermaphrodite or unisexual. Sepals free or coherent at the base, valvate in æstivation. Petals 6, free, nearly equal, valvate in æstivation in two series, concave at the base around the genitalia, open above. Stamens indefinite, oblong quadrate or cuneate; connective thickened, truncate or di-

lated above the cells. Torus plano-convex. Carpels indefinite; stigma various, usually ovate or linear-oblong; ovules geminate, erect. Fruit-carpels usually ellipsoidal oblong or obovate, 1- or 2-seeded.

Climbing or scrambling shrubs, with glabrous or glabrescent leaves. Flowers solitary fascicled or crowded upon woody, often stout, and almost invariably more or less sharply-hooked peduncles, which are often leaf-opposed or opposite to lateral branches.

A genus nearly confined to the tropics of Asia and Africa, generally easily recognized by its characteristic hooked peduncles. None of the African species have been identified with Asiatic ones.

Leaves large. Peduncle stout, many-flowered. Pedicels about 2 lines. Sepals broadly ovate, shortly acuminate. Petals oblong-lanceolate, about twice as long as the sepals . . . . . 1. *A. macrophylla.*

Peduncles with crowded, drooping, narrow flowers on pedicels ½–¾ in. long. Sepals minute. Petals linear or tapering, many times exceeding the sepals, inner trigonous, concave at the base. Fruit-carpels shortly pointed . . . . . 2. *A. Thomsoni.*

Peduncles 1-, 2-, several-flowered. Pedicels ¼–1 in. Sepals broadly oval or oblanceolate-elliptical. Petals nearly equalling the sepals, more or less broadly ovate, rather obtuse or shortly pointed. Fruit-carpels obtuse . . . . . 3. *A. brachypetala.*

1. **A. macrophylla,** *Hook. f. Fl. Nig.* 207. A small, glabrous tree, with large, broadly-elliptical leaves, rounded at the base, and shortly acuminate, 7–10 in. long, 5–6 in. broad. Petiole 3–4 lines. Peduncle recurved, branched, about 2 in. Pedicels thick, with small, deciduous, ovate bracteoles. Flowers small. Sepals pilose-pubescent externally. Petals 6, subequal.

Upper Guinea. Fernando Po, *T. Vogel!*

I have seen only imperfect flowering specimens of this plant, and no fruit.

2. **A. Thomsoni,** *Oliv.* A large climber. Glabrous, or the young shoots with few, scattered hairs. Leaves coriaceous, oblong-elliptical, very shortly or scarcely obtusely acuminate, rounded or obtuse at the base, with prominent midrib and lateral nerves beneath, glabrescent or glabrous, except the sometimes rusty-pubescent midrib, rather shining above, glabrous below, 4–8 in. long, 2–3 in. broad. Petiole 1–3 lines. Peduncles woody, recurved, extra-axillary. Pedicels bearing a small bracteole about or below the middle. Flowers reddish-brown, ½–¾ in. long. Calyx very small, about 2 lines across. Sepals broadly ovate, acute. Petals free, linear, narrow, 3 outer rather longer, dilated and concave at the base, rusty-pilose, with appressed hairs outside, 3 inner trigonous, with a concave recess around the genitalia. Stamens minute, closely crowded; anthers sessile or subsessile, the cells lateral, parallel, or slightly converging below, the connective dilated into an ovate or roundish, incurved, shovel-like appendage, as large or larger than the rest of the anther. Ovary slightly pilose above, with a pair of erect ovules; stigma various, ovate oblong or laterally dilated below. Fruit-carpels numerous, ellipsoidal, nearly glabrous, 1-seeded, 6–8 lines long, on stipes of about the same length or longer.

Upper Guinea. Old Calabar river, *Thomson!*

3. **A. brachypetala,** *Benth. in Linn. Trans.* xxiii. 467. Climbing shrub, the young shoots pubescent. Leaves coriaceous, elliptical or obovate-ellip-

tical, obtuse or very shortly and obtusely pointed; base obtuse or scarcely acute, glabrous, at first with scattered silky hairs; 1½–3½ in. long, ¾–2 in. broad. Petiole 1–4 lines. Flowers about ¾ in. diam., usually on hooked and forked peduncles, often opposed to short, lateral branchlets; sometimes the peduncles are very short and scarcely or not at all hooked. Sepals spreading, 4–6 lines long, tomentose externally. Petals connivent, plane, incurved at the base, somewhat acute, the 3 inner slightly shorter, glabrous or nearly so; anthers quadrate-oblong; connective thickened, truncate, scarcely produced beyond the cells. Carpels numerous, inserted on a pilose torus. Fruit-carpels glabrous, ellipsoidal or obovoid, ½–¾ in. long, on stipes of 3–5 lines; 2- or 1-seeded.

Mozamb. Distr. Tete, Zambesi, *Dr. Kirk!*
The fruit is said to be pleasant eating.

10. XYLOPIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 28.

Flowers hermaphrodite. Sepals more or less connate, rarely nearly free, valvate in æstivation. Petals 6 (3 in *X.? polycarpa*), valvate in æstivation in two series, 3 outer linear, linear-subulate, oblong or rarely ovate, thick, usually scarcely expanding or connivent, 3 inner rather or much shorter, similar in form and triquetrous above, or ovate-lanceolate and keeled and acute. Stamens indefinite, the innermost sometimes coherent by their filaments into a sheath surrounding the ovaries or inserted upon a sheathing, deciduous, annular extension of the torus, usually narrow-linear; anther-cells frequently multilocellate, connective truncate dilated or more or less subpeltate. Torus nearly plane or but slightly convex, plane or concave in the centre. Carpels few or numerous. Ovaries usually strigose-hairy. Styles elongate, exserted, forming a connivent cone; ovules usually 2 10. Fruit-carpels oblong or narrow-linear, continuous or torulose.—*Habzelia*, Hook. f. et Thoms. Fl. Ind. i. 123, as well as synonyms quoted in the 'Genera Plantarum.'—Trees or shrubs. Leaves more or less coriaceous. Flowers axillary, in fascicles or solitary, usually on short pedicels.

A rather large genus, represented in Asia and America as well as in Africa. The species are generally easily recognized by their axillary flowers and narrow thick petals, the carpels inserted upon the plane or concave centre of the torus and sometimes sheathed by an anther-bearing rim, and by the long connivent styles projecting considerably beyond the stamens. *X. africana*, with globose buds and ovate outer petals, is exceptional in the genus, but in other particulars it agrees well with *Xylopia*, and it is very closely allied to *X. rubescens*, in which the flowers are long and narrow.

Petals 6. Sepals or calyx-lobes ovate or broadly ovate-triangular, under 3 lines long, or more deeply connate, forming a cupulate, broadly-toothed calyx.
Leaves distinctly narrowed into the petiole, very coriaceous, reddish, at least when dry. Inner petals ovate-lanceolate (navicular), acute.
Buds nearly globose. Outer petals broadly ovate . . . . . 1. *X. africana.*
Buds narrow. Outer petals linear-lanceolate . . . . . 2. *X. rubescens.*
Leaves not narrowed into the petiole (or scarcely in *X. æthiopica* and *X. Thomsoni*). Inner petals narrow-linear or linear-subulate.
Flowers sessile or very shortly pedicelled.

Sepals connate more than halfway, forming a cupulate, broadly-toothed calyx. Buds 1½–2 in. Leaves 4–6 in. — 3. *X. æthiopica.*
Sepals connate halfway or less, or nearly free, broadly ovate-triangular.
Leaves rather obtuse or shortly and obtusely acuminate, 1½–3 in. Outer petals ¼ in. long or less. Fruit-carpels sessile or subsessile . . . . . — 4. *X. parviflora.*
Leaves acuminate, 3–5 in. Outer petals about 1½ in. long — 5. *X. Thomsoni.*
Leaves elliptical or oblong-elliptical, obtuse, 1½–2 in. Outer petals ¾–1 in. Fruit-carpels shortly stipitate . . . . — 6. *X. odoratissima.*
Flowers on slender pedicels, 3–6 lines long. Buds narrow acuminate. Carpels 3–6. Leaves 2–3 in. . . . . — 7. *X. acutiflora.*
Petals 3 (inner petals 0). Sepals lanceolate, spreading, 4–5 lines long. Fruit-carpels very numerous, on long stipes . . . . . — 8. *X. ? polycarpa.*

1. **X. africana,** *Oliv.* A much-branched, glabrous tree, attaining 30–40 ft. Leaves rigidly coriaceous, elliptical or obovate-elliptical, cuspidate, base cuneate more or less narrowed along the petiole, rather shining and reticulated above, dull and reddish beneath, the lateral nerves scarcely more prominent than the venation, usually 3–6 in. long, 2–3 in. wide. Petiole 2–3 lines. Flowers axillary, in fascicles of 2 or 3, or solitary, on short, thick, bracteate pedicels of 2–4 lines, or subsessile. Calyx-lobes broadly ovate-triangular, about 2½ lines broad. Outer petals thick, broadly ovate, with appressed silky-rusty hairs outside; inner petals smaller, ovate, shortly acuminate, slightly narrowed at the base, keeled above. Carpels about 8; ovules 4–6 in one series. Styles hairy, closely packed, equalling the ovaries. Fruit-carpels 1–2 in. long, oblong, 1- or few-seeded, smooth, glabrous, glaucous, on stipes of 4–6 lines.—*Melodorum africanum,* Benth. in Linn. Trans. xxiii. 477.

Upper Guinea. St. Thomas's Island, *Mann! Dr. Welwitsch!* Camaroons mountain, 4000 ft., *Mann!*

2. **X. rubescens,** *Oliv.* A glabrous tree, or with the extremities obsoletely pubescent. Leaves coriaceous, oblong-elliptical, 6–8 in. long, 2½–3 in. broad (but very imperfect in our specimen), glabrous. Flowers reddish-yellow. Outer petals linear-lanceolate, thick, triquetrous above from a concave base; inner petals very much shorter, equalling the concavity of the outer, boat-shaped, sharply keeled, with cuneate claws. Carpels 8–10, subulate; stigmas tapering. Ovules 5–6, uniseriate. Fruit not seen.

Upper Guinea. Old Calabar, *Thomson!*

3. **X. æthiopica,** *A. Rich. Fl. Cub.* 53 (*in note*). A tree sometimes measuring 30–60 ft. in height, the extremities glabrous or obsoletely pubescent. Leaves oblong-elliptical, usually shortly acuminate, coriaceous, shining above, with minute, appressed hairs scarcely perceptible to the eye beneath, 3–7 in. long, 1½–2 in. broad. Petiole 1–2 lines. Flowers axillary, subsessile or on very short pedicels, long and narrow, greenish, obtuse in bud. Outer petals narrow-linear, from a concave base; inner very narrow, rather shorter, triquetrous, acute. Inner anthers inserted upon a deciduous sheath surrounding the ovaries. Carpels numerous; ovules 7–8, uniseriate. Fruit-carpels narrow, torulose, glabrous, usually under 2 in. in length, 2–3 lines diam.—*Unona æthiopica,* Dun. Anon. 113. *Uvaria æthiopica,* Guill. et Perr.

Fl. Seneg. 9. *Habzelia æthiopica*, A. DC. Mém. Anon. 31. *Xylopia undulata* (*fruit only*), P. de Beauv. Fl. Ow. et Ben. i. t. 16.

Upper Guinea. Senegambia, *Leprieur, Perrottet, Ingram!* Sierra Leone, *Afzelius! Dr. Daniell!* Eppah, on the Niger, *Barter!* Prince's Island and Nun river, *Mann!*

4. **X. parviflora,** *Benth. in Linn. Trans.* xxiii. 479. A shrub attaining 20 ft. in height, the extremities glabrous or at first minutely pubescent. Leaves oblong-elliptical, rather obtuse, often shortly and obtusely acuminate, rather coriaceous, sparsely pubescent or glabrate beneath, 1½–3 in. long, 10–15 lines broad. Flowers on very short pedicels or subsessile; buds silky, narrow-conical. Outer petals about ½ in. long in our specimens; inner petals linear-subulate, from a slightly dilated, concave, cuneately-clawed base. Carpels about 16; stigmas tipped with a few bristle-like hairs; ovules several. Fruit-carpels oblong, thick, subsessile, 1–1½ in. long, nearly ⅓ in. diam., usually with several (1–6) transverse seeds.—*Uvaria parviflora*, Guill. et Perr. Fl. Seneg. 9. t. 3. *Cœlocline parviflora*, A. DC. Mém. Anon. 33.

Upper Guinea. Senegambia, *Leprieur and Perrottet;* Niger, *T. Vogel!* Bagroo river, *Mann!*

Nearly allied to this plant or to *X. acutiflora* must be *Cœlocline? oxypetala*, A. DC. Mém. Anon. 33 (*Unona oxypetala*, DC. Syst. Veg. i. 496), from Sierra Leone, *Afzelius*. It is described with the extremities rusty-pilose, with spreading hairs, glabrescent. Leaves oval-oblong, acuminate; midrib beneath pubescent. Pedicels axillary, very short. Calyx-lobes broad, obtuse. Petals linear, acuminate, equal, nearly 1 in. long.

5. **X. Thomsoni,** *Oliv.* A tree, with pubescent twigs or sparsely pilose, with spreading hairs. Leaves oval- or obovate-oblong, acuminate, rounded or cuneate at the base, thinly coriaceous, obsoletely silky-pubescent beneath, 4–5 in. long, 1–1¾ in. broad. Petiole 1–2 lines. Flowers light yellow, sessile or subsessile, in axillary fascicles of 2 or 3, or solitary, with small scaly bracts. Petals narrow-linear, tapering from a slightly broader base. Filaments of the innermost stamens connate around the carpels. Carpels about 20; ovules about 10, uniseriate. Fruit not seen.

Upper Guinea. Old Calabar, *Thomson!*

6. **X. odoratissima,** *Welw. mss.* A small, much-branched tree of 10–15 ft. Extremities leafy, pubescent. Leaves rather small and coriaceous, elliptical or oblong-elliptical, obtuse rounded sometimes minutely emarginate or more rarely subacute; base broadly rounded or obtuse or scarcely subcordate, obsoletely pubescent, at length glabrate above, thinly pilose-pubescent, especially on the midrib, beneath; 1½–2 in. long, ¾–1¼ in. broad; petiole 1–3 lines. Flowers yellowish-white, extremely fragrant, in axillary fascicles of 2 or 3 or solitary, on very short bracteate pedicels, rarely 2 lines long or subsessile. Bracts minute, scale-like, deciduous. Buds elongate, rather obtuse. Calyx 3-fid; lobes broadly ovate, triangular. Outer petals elongate, at length ¾–1 in.; inner rather shorter or nearly equalling the outer, linear-subulate, triquetrous above. Inner stamens inserted upon a raised, hollow, deciduous disk, surrounding the ovaries; connective truncate, slightly dilated. Carpels about 10. Ovaries pilose; styles subulate, projecting considerably beyond the androecium; ovules 4–6. Fruit-carpels oblique, shortly stipitate, 1–few-seeded, marked with prominent, longitudinal, forking nerves, glabrous; stipes 2–3 lines.

Lower Guinea. Huilla, Benguella, *Dr. Welwitsch!* Congo, *Smith!*

7. **X. acutiflora,** *A. Rich. Fl. Cub.* 55 (*in note*). A much-branched shrub or small tree, with slender, minutely pubescent or pilose extremities. Leaves oval- or lanceolate-oblong, usually narrowed to a rather obtuse or scarcely acute point, more or less coriaceous, glabrous and rather shining above, minutely silky-pilose beneath or glabrescent, midrib pubescent or pilose; 2–3 in. long, 7–12 lines broad; petiole 1–2 lines. Flowers axillary, 1–1½ in. long; pedicels with 1 or 2 small bracts; buds narrow, acuminate. Sepals ovate, acute. Petals linear-subulate, at length more or less spreading; styles connivent in a subulate cone. Ovules 8–10, 2-seriate or sub-2-seriate. Fruit-carpels oblong, scarcely torulose.—*Unona acutiflora*, Dun. Anon. 116. t. 22. *Cœlocline acutiflora*, A. DC. Mém. Anon. 32. t. 5 C.

Upper Guinea. Nupe, on the Niger, *Barter!*
Lower Guinea. Congo, *Smith!*

8. **X.? polycarpa,** *Oliv.* Leaves ovate or elliptical-oblong, subacuminate, coriaceous, shining above; pedicels short, axillary, solitary or in pairs. Sepals lanceolate, 4–5 lines long. Petals about 1 in. long, thick, triquetrous, tomentose externally. Fruit-carpels 30 or more, oblong, ¾ in. long, glabrous, on stipes of 1–1½ in.—*Anona? polycarpa*, DC. Syst. Veg. i. 499. *Cœlocline polycarpa*, A. DC. Mém. Anon. 33. *Melodorum? polycarpum*, Benth. in Linn. Trans. xxiii. 477.

Upper Guinea. Sierra Leone, *Afzelius, Daniell!*
The above description is taken from Mr. Bentham's memoir.

11. OXYMITRA, Blume; Benth. et Hook. f. Gen. Pl. i. 26.

Flowers hermaphrodite. Sepals 3, valvate in æstivation, free or connate at the base. Petals 6, valvate in 2 series in æstivation; the outer exceeding the inner, often very much longer, tapering, erect or spreading; inner petals ovate oblong or ovate-lanceolate, connivent around the genitalia. Stamens indefinite, linear, oblong or quadrate; the connective usually produced beyond the cells of the sessile or subsessile anther, dilated and truncate (excepting in species 1 and 2). Torus more or less conical. Carpels 10–∞; style linear, oblong or obovoid, with 1 basal ovule or 1 to 3 superposed. Fruit-carpels (known only in one African species) stipitate, 1- or 2-seeded.

Trees or shrubs, with penniveined leaves, glabrous or glabrescent in the African species. Flowers tolerably large, pedicellate, extra-axillary or axillary, solitary or fascicled, usually yellow or greenish-white in the African species.

I follow Mr. Bentham in including *O. hamata* in the same genus with the three other African species, which he associated with it in *Orymitra*, although that species and *O. myristicifolia* appear to me generically different from the rest. They differ in the form of the inner petals, their anthers without a dilated connective, and in their solitary erect ovules.

The genus is confined to the tropics of the Old World. None of the African species occur out of the continent, and none have been met with on its eastern side.

(§ *Stenanthera.*) Anthers linear, at least 5 times as long as broad; connective not dilated and truncate. Ovules solitary.
Leaves oblong-elliptical. Sepals minute, triangular, acute, about 1 line long. Outer petals elongate, linear-lanceolate, often hooked . . . . . 1. *O. hamata.*

Leaves oblong-elliptical, elongate. Sepals ovate, acuminate, about 3 lines long. Outer petals broadly linear-lanceolate . . . . 2. *O. myristicifolia.*
Anthers less than 5 times as long as broad; connective dilated and truncate. Ovules 2 or 3.
Glabrous. Pedicels solitary. Sepals broadly ovate, 1½ lines long. Outer petals ovate-lanceolate. Ovaries glabrous . . . . . 3. *O. gracilipes.*
Extremities puberulous. Pedicels solitary. Sepals ovate-oblong, obtuse, 2–3 lines long. Outer petals broadly elliptical. Ovaries pilose . . . . . 4. *O. platypetala.*
Pedicels in axillary fascicles, of 2–6. Sepals orbicular, 1 line diam. Outer petals obovate-oblong. Ovaries glabrous; stigma capitate, sessile . . . . . 5. *O. patens.*

1. **O. hamata,** *Benth. in Linn. Trans.* xxiii. 471. *t.* 50. A small tree, with slender, rusty-pubescent or tomentose twigs. Leaves distichous, acuminate, glabrous above, puberulous and glabrescent beneath, the midrib and lateral nerves rusty-pubescent; 3–5 in. long, 1–1¾ in. broad; petiole 2 lines. Peduncles solitary, extra-axillary, 1-flowered, 1–2 in. long, erect or ascending, thickened at the apex. Sepals recurved. Outer petals 2–2½ in. long, 2½–3 lines broad, base concave; inner petals very thick, concave below, trigonous above, 4–6 lines long. Anthers 5–6 times as long as broad; the connective slightly produced, obtuse or rather acute, scarcely thickened. Ovary villous, 1-ovulate; stigma narrow, linear, at length clavate and obtuse. Fruit unknown.

Upper Guinea. Bagroo river, *Mann!*

2. **O. myristicifolia,** *Oliv.* Branches terete, soon glabrous. Leaves rather coriaceous, acute or acuminate, rounded or obtuse at the base, glabrous and smooth above, obsoletely pubescent glabrescent beneath; midrib and lateral nerves prominent, venation obscure; 8–10 in. long, 2½–3 in. broad; petiole 4–6 lines. Pedicels 1 or 2, erect, nearly 1 in. long, puberulous, on very short axillary shoots or peduncles, 2–4 lines long. Sepals broadly ovate below, abruptly acuminate. Outer petals "bright yellow," coriaceous, subacute, sparsely pubescent outside, ¾–1 in. long in our specimen, but perhaps not fully grown; inner petals thick, concave below, thickened and trigonous above, 5–6 lines long. Anthers elongate, narrowly linear; connective scarcely produced beyond the cells and not thickened. Ovaries pubescent, tapering into slender subulate styles; ovules solitary, erect. Fruit unknown.

Upper Guinea. Old Calabar, *Thomson!*

3. **O. gracilipes,** *Benth. l.c.* A glabrous shrub of 25 feet with subcoriaceous, elliptical or oblanceolate-elliptical, rather obtusely acuminate leaves, about 3 in. long, 1¼–1½ in. broad; petiole 2 lines long. Flowers "greenish-white," on slender pedicels, 1 in. long or more. Sepals recurved. Outer petals spreading, rather acute, in our specimens about ½ in. long, but probably not developed; inner petals connivent, about half as long. Anthers short, with the thickened connective forming a capitate disk above the cells. Ovaries tapering into short linear stigmas; ovules 2, superposed. Fruit not seen.

Upper Guinea. Fernando Po, *Mann!*

4. **O. platypetala,** *Benth. l.c.* A small tree. Leaves submembra-

nous, obovate-elliptical, shortly acuminate, more or less obtuse at the base, glabrous, about 3 in. long, 1¼ in. broad; petiole 1 line. Pedicels ½–1 in., very slender, like the petioles puberulous. Outer petals obtuse, plane, 5–7 lines long in our specimen; inner petals 2–3 lines, more or less connivent. Anthers linear, 2–3 times as long as broad, with a dilated, rhomboidal, truncate connective. Carpels numerous; ovary and recurved stigma pilose; Ovules 3 or 2, superposed. Fruit not seen.

Upper Guinea. Bagroo river, *Mann!*

5. **O. patens,** *Benth. l. c. t.* 51. A glabrous tree, attaining a height of 70 ft. Leaves rather coriaceous, at length oval-oblong or elliptical, sometimes narrow and elongate, acuminate, the base acute or cuneate; shining, with looped lateral nerves above; 5–7 in. long, 1½–1¾ in. broad; petiole 2–6 lines. Flowers greenish-yellow, on slender naked pedicels, ¾–1 in. long. Outer petals obovate-oblong or oval, rather obtuse, 4–6 lines long, spreading; inner petals broadly ovate or triangular, connivent. Anthers very short, truncate; connective much dilated over the cells. Carpels about 10; ovules 2, sometimes with a septum more or less developed between them. Unripe fruit-carpels very shortly stipitate, globose, 1-celled, or 2-seeded with a dissepiment between the seeds.

Upper Guinea. Eppah, on the Niger, *Barter!* Bagroo river, *Mann!* Old Calabar, *Thomson!*

Dr. Welwitsch collected in the island of St. Thomas an *Anonacea* in fruit, which is probably allied to this species. The leaves are broader and the stipes of the globose carpels ½–¾ an inch.

12. UNONA, Linn. f.; Benth. et Hook. f. Gen. Pl. i. 24.

Flowers hermaphrodite. Sepals 3, nearly or quite free in the African species, valvate or very slightly imbricate at the base. Petals 6, in 2 series, plane, spreading or the base more or less connivent around the genitalia, nearly equal or the inner shorter or rarely wanting. Stamens indefinite, oblong-quadrate or -cuneate; connective thickened and globose or truncate and dilated above the anther-cells. Torus plane or convex. Carpels indefinite (3 in *U. ? lepidota*), free; stigma ovate obovate oblong linear or clavate, sulcate on the inner face (capitate in *U. ? lepidota*); ovules 2–∞, 1-seriate or sub-2-seriate. Fruit-carpels usually stipitate, constricted between the seeds or continuous or ovoid.—Trees or shrubs, erect or scandent. Flowers solitary or fasciculate, variable in size.

A genus confined to tropical Asia and Africa. The African species are endemic.

Carpels numerous (10–∞).
- Flowers rather large; outer petals erect, connivent at the base, at length narrowed above. Peduncles stout, 1-few-flowered . . 1. *U. hirsuta.*
- Flowers small (¼ in. or less); outer petals broadly ovate or ovate-rotundate. Pedicels slender, solitary or fascicled.
  - Flowers in fascicles of 2–5.
    - Leaves sharply acuminate. Bracteoles small . . . . . 2. *U. lucidula.*
  - Flowers solitary.
    - Bracts large, cordate, amplexicaul . . . . . 3. *U. obovata.*
    - Bracts small, lanceolate or ovate. Leaves pilose-pubescent beneath . . . . . 4. *U. ferruginea.*
    - Bracts small, lanceolate or linear-lanceolate. Leaves glabrate . 5. *U. parvifolia.*

Carpels 3. Acuminate leaves beneath and buds lepidote . . . . . 6. *U. ? lepidota.*

1. **U. hirsuta,** *Benth. in Linn. Trans.* xxiii. 469. A shrub of 20 ft., the extremities and under-surface of the leaves, especially on the prominent midrib and lateral nerves, rusty hirsute-pilose. Leaves elliptical- or obovate-oblong, obtuse or retuse, cordate at the base, glabrescent above, paler, glaucous and more or less hairy beneath, with transverse, subparallel veins, 4–6 in. long, 2–3 in. broad. Petiole 2–6 lines. Peduncles lateral or subterminal, firm, 1- or few-flowered, 1–2 in. long or much shorter, with 1 or more silky-pilose linear-lanceolate bracts. Sepals broadly ovate-lanceolate, acute, 5–6 lines long. Outer petals erect, obtusely pointed, shortly tomentose, 9–10 lines long, 6 lines broad, probably larger in fully-developed flowers; inner petals much shorter, similar in form, erect, connivent at the base. Torus plane. Carpels about 30, free, the ovary with appressed hairs; stigma linear, recurved, about equal in length to the ovary; ovules 2, superposed. Fruit not seen.

Upper Guinea. Fernando Po, *Mann!*

2. **U. lucidula,** *Oliv.* A shrub, sometimes tree-like, 6–10 ft., with loose spreading branches or subscandent. Extremities obsoletely pubescent or glabrate. Leaves obovate-elliptical or oblanceolate-oval, sharply acuminate, rounded or obtuse (except in the narrow-leaved forms) at the base, glabrous and more or less shining above, intensely glaucous with rather prominent midrib and lateral veins beneath. Flowers in leaf-opposed or terminal fascicles of 2–5, on slender bracteate pedicels of $\frac{1}{6}$–1 in. Bracts small, lanceolate or ovate. Sepals free, ovate-elliptical, scarcely acute, persistent, at length oblong-ovate. Stamens scarcely exceeding 20–30. Carpels about 10 20, with pilose ovaries; ovules 3 or 4. Fruit-carpels scarlet, cylindrical-torulose, 1–4-seeded, on stipes of 1–2 lines.

Lower Guinea. Golungo Alto and Pungo Andongo, Angola, *Dr. Welwitsch!*

3. **U. obovata,** *Benth. in Linn. Trans.* xxiii. 469. A small tree, with slender, divaricate, minutely-pubescent twigs. Leaves membranous, obovate or obovate-oblong, obtuse rounded or broadly and obtusely pointed, base cordate or subcordate; with minute, scattered hairs above, sparsely and shortly pilose-pubescent beneath, 2½–5 in. long, 1½–3 in. broad. Petiole 2–4 lines. Peduncles slender, 1-flowered, usually leaf-opposed, 1–2 in. in length, with a sessile orbicular or ovate-cordate amplexicaul bract near the base. Sepals rotundate, obtuse, about 2 lines long and broad, spreading, pilose-tomentose externally. Outer petals greenish, spreading, ovate-rotundate, obtuse, about 3 times as long as sepals, shortly tomentose externally; inner petals shorter. Torus slightly convex. Ovaries densely pilose; stigma very short, glabrous, obtuse or truncate. Fruit-carpels several, 1–3-seeded in the specimen seen, constricted or continuous, glabrous, rugulose when dry, with stipes of about ½ inch.

Mozamb. Distr. Foot of Moramballa, Zambesia, *Dr. Kirk!*

4. **U. ferruginea,** *Oliv.* A shrub usually more or less scandent, with elongate lateral branches. Annual shoots rusty pilose-pubescent with short spreading hairs. Leaves membranous, ovate-oblong or -elliptical, elliptical or elongate-oblanceolate, apex rounded or slightly narrowed obtuse, base ob-

tuse, narrow in the elongate form subcordate in the broader, glabrescent, above the midrib minutely pilose, pilose-pubescent and glaucous beneath, the midrib and lateral nerves rusty with short spreading hairs; 3–6 in. long more or less, 1½–3 in. broad above the middle. Petiole 1–2 lines. Flowers solitary extra-axillary or leaf-opposed, on slender, pilose, bracteate pedicels of ½–1 in. Bracts small, lanceolate or ovate-lanceolate, near the base of the pedicel. Calyx 3-fid; lobes broadly ovate, persistent. Outer petals ovate; inner nearly equalling the outer. Connective much dilated. Carpels numerous. Ovaries glabrous or thinly pilose on a hairy receptacle; stigma shorter than or equalling the ovary; ovules 2, superposed. Fruit-carpels scarlet, ellipsoidal or oblong, or 2-seeded and constricted between the seeds, apiculate, glabrous, on stipes of about 1 line.

Lower Guinea. Golungo Alto and Cazengo, Angola, *Dr. Welwitsch!*

5. **U. parvifolia,** *Oliv.* A scandent shrub often with long weak branches. Extremities rusty-pubescent. Leaves firmly membranous or subcoriaceous, oblanceolate- or obovate-oblong or elliptical-oblong, obtuse shortly and obtusely pointed or somewhat emarginate, obtuse or rounded at the base, minutely punctate and glabrate above, glabrescent with the midrib pubescent-pilose beneath, varying from ¾–3½ in. in length, on petioles of 1–2 lines. Flowers usually solitary, on slender leaf-opposed or extra-axillary pedicels of ¼–¾ in. Bracts very small, linear or lanceolate, near the base of the pedicels. Sepals nearly free, broadly ovate-rotundate. Outer petals broadly ovate, exceeding the inner elliptical petals. Anthers truncate, the connective rather broadly dilated. Carpels 12–15. Ovaries glabrous; stigma sessile, obtuse or subcapitate; ovules about 4–6, uniseriate. Fruit-carpels scarlet, 1–4-seeded, cylindrical-torulose, apiculate or obtuse, on stipes of 1 2 lines.

Lower Guinea. Golungo Alto, Angola, *Dr. Welwitsch!*

6. **U.? lepidota,** *Oliv.* A small tree of 25 ft., the twigs, leaves beneath, and buds covered with reddish-brown, glistening, peltate scurf-scales. Leaves rather coriaceous, oval-oblong, acuminate, the midrib and lateral nerves prominent below, glabrous above, 5–7 in. long, 1½–2 in. broad. Petiole 2–3 lines long. Flowers leaf-opposed or terminal, solitary, on peduncles of 4 6 lines, not seen expanded. Buds broadly ovoid, umbilicate, acute, ½ in. broad and long. Sepals very small, broadly ovate-triangular, pointed, recurved. Petals nearly equal, rather thin, coriaceous, broadly ovate, concave, valvate in æstivation; the inner petals obsoletely puberulous, not lepidote. Stamens very numerous and closely packed; anthers sessile, oblong-cuneate, connective dilated, truncate. Carpels 3, oblong, lepidote, with sessile, capitate, obtuse, shortly pilose stigmas; ovules numerous. Fruit not seen.

Upper Guinea. River Muni, *Mann!*
A very doubtful member of the genus.

Unona? sp. A strong, glabrate, climbing shrub, with the extreme branches often sharply decurved as cirrhi. Leaves chartaceous, elongate-oval, pointed or acuminate, glaucous beneath, 3–4 in. long, 1 -1½ in. broad.

Fruit-carpels about 8–15,-1-seeded, ellipsoidal, about ¾ in. long, 4–5 lines broad, on stipes of ½ in., more rarely 2-seeded, 1 in. in length. Flowers not seen.

Lower Guinea. Pungo Andongo, Angola, *Dr. Welwitsch!*

13. **MONODORA,** Dunal; Benth. et Hook. f. Gen. Pl. i. 26.

Flowers hermaphrodite. Sepals 3, free or connate at the base. Petals 6, valvate in two series, coherent at the base, 3 outer usually considerably larger than the inner, spreading, ovate lanceolate or linear, usually with a much crisped or undulated margin, 3 inner petals erect or connivent at least at first, ovate or rotundate, narrowed into a more or less distinct claw. Stamens indefinite; anthers sessile, short, oblong or quadrate, with an obtuse or truncate connective but slightly or not at all thickened beyond the cells. Ovary globose or ovoid, unilocular, with a sessile or subsessile peltate or obtuse stigma sometimes minutely lobulate; ovules indefinite, closely crowded upon the walls of the ovary. Fruit globose or ovoid, 1–6 in. diam., smooth or longitudinally and obscurely ridged, closely packed with an indefinite number of seeds.

A genus of 8 or 9 species (some of which are too imperfectly known to be described), confined to Tropical Africa.

Monodora differs from all other genera of *Anonaceæ* in having a syncarpous, one-celled ovary, with numerous parietal ovules, as well as in the spreading, undulated and variegated outer petals, which are coherent at the base with the inner petals, as in *Hexalobus*. In *Monodora grandiflora* the flowers are about 6 in. across and the globose fruit 6 in. diam.

Branches and leaves entirely glabrous. Outer petals from lanceolate to ovate, usually narrowed towards the extremity.
- Peduncles bracteate from the middle to near the summit immediately under the flower. Inner petals ovate ovate-cordate or cordate, with short pilose auricles, shortly clawed . . . . . 1. *M. Myristica.*
- Peduncles bracteate near the middle. Inner petals ovate or ovate-lanceolate, with lateral pilose teeth, gradually narrowed into a rather long claw . . . . . 2. *M. tennifolia.*
- Peduncles bracteate near the middle. Inner petals with the lamina broader than long, without lateral pilose teeth; abruptly narrowed above into a cusp or short acumen, below into a narrow claw . . 3. *M. angolensis.*
- Peduncles bracteate at or below the middle. Inner petals orbicular, concave, obtuse, with a pilose margin, abruptly narrowed into a short cuneate claw . . . . . 4. *M. brevipes.*

Extremities, pedicels, and petioles pilose or pubescent. Outer petals very narrow linear . . . . . 5. *M. stenopetala.*

1. **M. Myristica,** *Dun. Anon.* 80. Leaves obovate- or oblong-elliptical, very shortly pointed or abruptly cuspidate, rounded obtuse or slightly cordate at the base, at length firmly membranous or subcoriaceous, ½–1 ft. (or sometimes nearly 2 ft.) long, 1–8 in. broad, on the flowering shoots usually comparatively small. Peduncles extra-axillary or leaf-opposed, on young shoots or on short lateral twigs from wood of a previous year, ½–1½ in. long. Bract leafy ovate or ovate-lanceolate near or above the middle or sometimes at the summit of the peduncle. Flowers 1½–6 in. across, fragrant. Sepals acuminate or tapering, undulate. Outer petals more or less ovate-lanceolate, tapering, much crisped and undulate, greenish-white or

yellowish, variegated with very dark blackish-red or purple-brown spots. Inner petals shortly clawed, lamina ovate-cordate broadly cordate or ovate, obtuse, more or less distinctly auricled at the base on each side; auricles incurved, pilose; the margin and sometimes the back of the petals are also more or less pilose or puberulous, ½–⅔ as long as the outer petals. Stigma lobulate or nearly entire. Fruit large, globose, usually more or less distinctly longitudinally striate or obscurely ridged, with a thick woody pericarp, 4–6 in. diam.—Bot. Mag. 3059. *Xylopia undulata*, P. de Beauv. Fl. Owar. i. 27 t. 16 (*excl. fr.*).

Var. *grandiflora* (*M. grandiflora*, Benth. in Linn. Trans. xxiii. 474, tabb. 52, 53.) Leaves ½–2 ft. Bract about the middle of the peduncle or a little above.

Upper Guinea. St. Thomas's and Prince's Island, Ambas Bay, *Mann!* Old Calabar, *Thomson!*

Lower Guinea. Golungo Alto, Angola, in primeval forests attaining an elevation of 2400 ft. above the sea, *Dr. Welwitsch!*

In the original *M. Myristica*, as described by Dunal and Mr. Bentham from specimens gathered from trees (one or two?) introduced into the West Indies, where it is cultivated under the name of the Calabash Nutmeg, the leaves are usually rather small, about 4–6 in. long and 1–2 in. in breadth, and the bract is near the summit of the peduncle immediately under the flower. I have not seen any wild specimens precisely corresponding to these cultivated ones, but I feel little hesitation in regarding them as specifically the same.

Dr. Welwitsch describes the tree as growing to a height of 50–60 ft., with a trunk 2–2½ ft. diam.

2. **M. tenuifolia,** *Benth. in Linn. Trans.* xxiii. 475. A tree from 7–30 ft. in height. Leaves membranous, oblanceolate or oval-oblong, acute or shortly acuminate, at the time of flowering usually not exceeding 3–4 in. in length, but not fully developed. Petioles 1–2 lines. Peduncles either from the young extremities and nearly leaf-opposed or on short lateral shoots from wood of the previous year, about 1–2 in. long, with an ovate or ovate-lanceolate clasping bract. Flowers variable in size, at length 2–4 in. across. Sepals connate at the base, more or less ovate-lanceolate, tapering, acute or obtuse, undulate. Outer petals pearly- or greenish-white marked with deep red, crisped, ovate-lanceolate, tapering; inner petals much shorter, the extremity linear-oblong or obtusely acuminate, with a pilose lateral tooth on each side near the middle. Fruit ovoid, attaining 4 in. in length and 3 in. diam.

Upper Guinea. Eppah and Aghamia, on the Niger, *Barter!* Ambas Bay and Fernando Po, *Mann!* Old Calabar, *Mann! Thomson!*

3. **M. angolensis,** *Welwitsch in Linn. Trans.* xxvii. (*ined.*) *t.* 1. Perfectly glabrous. Leaves oblong-elliptical or obovate-oblong, shortly acuminate or cuspidate, rounded or cuneate at the base, membranous at first, at length more or less coriaceous, 2–6 in. long, 1–2¼ in. broad. Flowers 1½ 3 in. diam. Peduncles 1–3 in. Sepals lanceolate, from a rather broad base, crisped, deciduous. Inner petals with a transversely elliptical or oblong lamina, terminating in an abrupt obtuse or rather acute cusp or acumen much shorter or sometimes nearly equalling the shorter diameter of the lamina; claw narrow, 2 3 lines long, more or less puberulous-tomentose on the margin or nearly glabrous, destitute of the lateral, pilose, tooth-like appendage of the lamina of *M. tenuifolia*. The inner petals are coloured rose or pink, at least toward the margin; the outer variegated with deep red or pur-

plish black. Fruit ovoid-ellipsoidal, 4 in. long, 2½–3 in. diam., marked with faint longitudinal ridges, very shortly and abruptly apiculate, at length tardily opening more or less longitudinally.

Upper Guinea. Old Calabar, *Thomson !*

Lower Guinea. Golungo Alto, Angola; a tree of 15–25 ft., in elevated primeval forests, *Dr. Welwitsch !*

Var. *sempervirens.* Leaves shining above. Petioles glaucous. Pungo Andongo, *Dr. Welwitsch !*

4. **M. brevipes,** *Benth. l. c.* A tree attaining 30–40 ft. in height. Leaves firmly membranous or at length coriaceous, obovate-oblong or obovate-elliptical, shortly and abruptly acuminate, the narrowed base very obtuse or rounded, midrib and lateral nerves prominent below; 6–12 in. long, 3–5 in. broad. Flowers 1–2 in. diam., solitary or two together, on pedicels 1–2 in. long, from nodes on the branches of a previous year; at first white, changing to dull yellow veined with red. Pedicel with 1 or 2 coriaceous, rotundate or ovate bracts. Sepals 4–5 lines long, very obtuse and but slightly wavy. Outer petals obovate-lanceolate, with a crisped margin, about 1 in. long, narrowed to the base; inner petals rotundate or orbicular, about 7–8 lines diam. Fruit globose, nearly 3 in. diam., either without longitudinal ribs or faintly ridged; pericarp thick, coriaceous and somewhat woody.

Upper Guinea. Fernando Po and Prince's Island, *Mann !*

5. **M. stenopetala,** *Oliv.* A small tree or shrub, flowering before the leaves are fully developed. Leaves obovate or obovate-oblong, obtuse or rounded at the extremity, on short pubescent petioles (not seen fully grown). Flowers numerous along the slender naked twigs, usually from nodes on the branches of the previous season. Pedicels slender, straight, 4–6 lines long, with a small obtuse bract near the middle. Flowers yellow. Sepals very shortly connate, ovate-oblong, obtuse, 2½ lines long. Outer petals widely spreading, 1½ 2 in. long, tapering from the middle, which is about 2 lines broad, slightly wavy; inner petals at first erect or connivent, 2½–4 lines long; lamina ovate-rotundate, obtuse, setose-pilose on the inner face, abruptly narrowed into a linear-oblong claw equalling or exceeding it in length. Stigma obtuse.

Mozamb. Distr. Rapids of the Shire, *Dr. Kirk !* West of Lake Nyassa, *Livingstone Expedition !*

An imperfect fruit, apparently of a *Monodora*, collected by Dr. Kirk in 1861, labelled from the Shire Rapids, is in the Kew Museum and probably belongs to this species. It is somewhat (obliquely) ovoid or slightly narrowed at each end; the pericarp coriaceous and rugose.

In the Kew herbarium and Museum there are fruits belonging apparently to three undescribed species of *Monodora* :—

1. Niger, *Barter.* Globose, about 2 in. diam., without ribs or striæ and with a comparatively thin pericarp.

2. Zambesi, *Kirk.* Also globose, about 1½ in. diam., and marked with raised ribs, which, however, may be due to shrivelling.

3. ? Rovuma, *Meller.* Pressed fruits and leaves. The fruit apparently ellipsoidal; the pericarp thin, 2 3 in. long. Leaves coriaceous, glabrous, 3–5 in. long. This may possibly be *M. stenopetala*, or perhaps not a *Monodora* at all.

Order IV. MENISPERMACEÆ (by Prof. Oliver).

Flowers small, diœcious. Sepals usually 6, sometimes 9–12, rarely 4 or 1, nearly always free, usually imbricate, in 2–4 series; the outer smaller, often very minute. Petals 6, shorter than or not exceeding the inner sepals, rarely 4 or fewer, free or united (in *Cissampelos*) or 0. Male fl.: Stamens equal in number and opposite to the petals, rarely fewer or more, free or united; anthers free, 2–4-celled, dehiscing longitudinally or transversely, or connate in a peltate disk. Female fl.: Staminodia 6 or 0. Carpels free, usually 3, in few genera 1 or 6–12, sessile or stipitate; stigma terminal, entire or divided. Ovules solitary, usually amphitropous. Fruit-carpels drupaceous, with the scar of the style subterminal or, by excentric growth, brought near to the base. Seed concave or sulcate on the inner face, often curved in the form of a horseshoe around an intruded portion of the putamen, with uniform or ruminate albumen or exalbuminous; embryo with the cotyledons appressed or divaricate.—Climbing or twining shrubs or more rarely perennial herbs. Leaves alternate, exstipulate, usually palminerved, entire or lobed. Flowers small or minute, fascicled, cymose racemose or panicled, rarely solitary.

A considerable tropical Order, with a few species extending into cool countries both in the New and Old World. The species are generally easily recognizable by their climbing habit, minute unisexual 3-merous flowers, with stamens opposite to the petals, apocarpous pistil and the form of the seed. Several of the following genera are confined to tropical Africa, but as some of them rest upon imperfect material, it is uncertain whether they can be maintained.

In some of the genera it is difficult to know what to call sepals, petals, and bracteoles. In doubtful cases I have generally employed the terms used in the 'Genera Plantarum.'

Drupes with the scar of the style near the apex.

Stamens 6, more or less connate; anthers 2-locular, dehiscing longitudinally . . . . . 1. Chasmanthera.

Stamens 6, free or united below; anthers 4-lobed, dehiscing transversely . . . . . 2. Jateorhiza.

Stamens 6, free; anthers 2-locular, dehiscing longitudinally . . 3. Tinospora.

(See 8. *Rhigiocarya*, and 9. *Triclisia*.)

Drupes with the scar of the style near the base.

Carpels 9–12.

Sepals 6. Petals 6. Stamens 6, free or united below . . . 4. Tiliacora.

(See 9. *Triclisia*.)

Carpels 3. Stamens 3–9, free or the filaments united below.

Sepals 6. Petals 6. Stamens 6, free . . . . . 5. Cocculus.

(See 10. *Synclisia*; 11. *Penianthus*; 12. *Syrrhonema*.)

Carpel solitary. Stamens with the anthers united into a peltate disk.

Male fl.: Sepals 4. Petals united into a minute cupuliform corolla. Female fl.: Sepal 1 . . . . . 6. Cissampelos.

Male fl.: Sepals 6 (or more). Petals 3–5, free. Female fl.: Sepals 3–4 . . . . . 7. Stephania.

1. CHASMANTHERA, Hochst.; Benth. et Hook. f. Gen. Pl i. 34.

Sepals 6, in 2 series; 3 inner larger, membranous. Petals 6, shorter than the inner sepals, thickened along the middle and towards the base. Male fl.:

Stamens 6, monadelphous; filaments free above or united to the anthers (or 3 outer free in *C. ? nervosa*); anthers free (obovoid or ellipsoidal in Niger specimens), 2-locular, dehiscing longitudinally. Female fl.: Staminodia 6. Carpels 3, each narrowed above into a short acuminate, linear, recurved style. Drupes ovoid, with the slightly oblique scar of the style near the apex. Putamen thin, very concave on the inner face, the intruded portion nearly hemispherical. Seed meniscoid, with ruminate albumen. Cotyledons broad, laterally divaricate. — A climber with large, membranous, cordate leaves. Flowers in simple axillary racemes.

The genus consists of a single species, if the Niger specimens be rightly referred to the same as the Abyssinian, upon which the original description of the genus was based. I have not found a seed in any of the drupes which I have opened. The above description of it is from the 'Genera Plantarum.'

Annual shoots and leaves pubescent. Racemes simple, solitary. Stamens monadelphous . . . . . 1. *C. dependens.*

Wholly glabrous. Racemes (♂) simple or panicled, two or three together. Three outer stamens free . . . . . 2. *C. ? nervosa.*

1. **C. dependens,** *Hochst. in Flora*, 1844, 21. Stem with softly pubescent or shortly pilose annual branches. Leaves cordate, entire or more or less distinctly 3-lobed towards the apex, lobes distant rounded, or obtusely angular or broadly and obscurely 5–7-sinuate-lobed, extremities of the lobes with or without the short, soft, excurrent tip of a nerve, sinus of the cordate base broad and rounded or narrow and deep; thinly membranous, very shortly and softly pubescent, usually 3–6 in. broad; petiole 2–4 inches. Racemes axillary, 3–9 in. long. Bracts filiform or subulate, pilose, 2–3 lines long. Male flowers solitary or 2 or 6 in the axil of each bract; pedicels shorter than or scarcely equalling the bract. Fruit-pedicels patent, at length recurved, exceeding the bracts.

Upper Guinea. Niger, *Barter!*

Nile Land. Abyssinia, *Schimper!* (? Unyoro, *Speke and Grant*, an imperfect specimen.)

Barter describes the flowers as green, the fruit scarlet.

2. **C. ? nervosa,** *Miers in Ann. Nat. Hist. Ser.* 3. xiii. 487. Leaves cordate, shortly acuminate or apiculate, 5-nerved, 2½–4 in. broad, on petioles of 2–3 in. Male flowers in simple or paniculate axillary racemes, nearly equalling the petioles, usually 2 or 3 together. Stamens 6; 3 outer free; 3 inner connate throughout; anthers 2-celled. Female flowers and fruit unknown, unless the fruiting specimen described by Mr. Miers, under the name of *Rhigiocarya*, belong to this species, which appears to me not improbable. Perhaps both *C. ? nervosa* and *C. dependens* might be merged in *Tinospora*, as suggested to me by Dr. Thomson.

Upper Guinea. Bagroo river, *Mann!*.

2. **JATEORHIZA,** Miers; Benth. et Hook. f. Gen. Pl. i. 34.

Sepals 6, in 2 series, nearly equal or the inner slightly larger. Petals 6, shorter than the sepals, with involute margins. Male fl.: Stamens 6; filaments free or more or less connate below; anthers free, extrorse, 4-lobed, de-

hiscing widely and transversely, showing the 4 minute cells. Female fl.: Carpels 3, with reflexed divided or torn stigmas. Drupes ovoid, with the scar of the style nearly terminal. Putamen rather concave (*J. Columba*) or with a smaller open cavity (*J. strigosa*) on the inner face. Seed meniscoid; albumen more or less ruminate. Embryo with laterally divaricate cotyledons. —Climbers with large membranous palmately-lobed leaves. Male flowers in long, slender, axillary, racemose panicles, usually sessile on the short lateral branches; female flowers in simple or nearly simple racemes.

Basal-lobes of the leaves open or slightly overlapping at the sinus. Bracteoles setose-ciliate. Filaments more or less united below . . . . 1. *J. strigosa.*
Basal-lobes rounded and not overlapping. Male inflorescence setose-hispid. Bracteoles setose-ciliate. Filaments free . . . . . 2. *J. Columba.*
Basal-lobes more or less overlapping. Male inflorescence nearly glabrous. Bracteoles sepal-like, without or sometimes with cilia . . . . . 3. *J. Miersii.*

1. **J. strigosa,** *Miers in Fl. Nigrit.* 213. An extensive climber; the stem very rough, with spreading setæ or hispid-pilose on the young branches. Leaves 3–5-lobed; base deeply cordate; lateral and terminal lobes deltoid or rounded with a short acumen, glabrous or glabrescent excepting on the nerves and frequently the veins, which are more or less scattered with short setæ; 5–10 in. diam., on hispid petioles of variable length. Bracts of the long slender racemose panicles of male flowers ciliate with long setæ as well as the bracteoles on the short lateral branches. Drupes setose, about ¾ in. long.—*Cocculus? macranthus,* Hook. f. Fl. Nigrit. t. 18 (the male inflorescence incorrectly drawn); Hook. Ic. Pl. 759.

Upper Guinea. Fernando Po, *T. Vogel! Barter! Mann!*
Lower Guinea. Congo, *Tuckey* (*Miers*).

2. **J. Columba,** *Miers in Fl. Nigrit.* 214, *in note.* Stem rough with spreading setæ or hispid. Leaves 5- or 3-lobed, deeply cordate at the base, terminal and lateral lobes extending one-third or halfway to the petiole, more or less broadly ovate- or triangular-rotundate, or the central lobe broadly obovate, each usually with a short acumen and sometimes a lateral tooth, shortly hispid or hispid-pubescent above and below or sometimes glabrescent excepting on the veins; from 6 to 8 in. diam. to twice as large, on hispid petioles of 4–8 in. Racemose panicles of male flowers very slender, 6 in. to 1 foot or more in length, the flowers sessile or subsessile on the nearly glabrous, filiform, lateral branches; bracts and bracteoles setose-ciliate. Drupes ovoid, setose, in racemose clusters of 4–6 in., ½–¾ in. long, obtuse or scarcely pointed.—*Cocculus palmatus,* DC. Syst. Veg. i. 522, and Wall. Cat. 4953 A. *Menispermum Columba,* Roxb. Fl. Ind. iii. 807.

Mozamb. Distr. Zambesi, *Dr. Kirk!* "near Oiba and Mozambique" (*Roxb. Fl. Ind.* iii. 807).
This plant furnishes the Columba root used in medicine.

3. **J. Miersii,** *Oliv.* Stem sparsely setose or strigose. Leaves very large, membranous, 5-lobed or with an additional obscure lobe on each side of the deeply cordate base; lobes broad, extending half to one-third of the way to the petiole, very shortly acuminate or acute; sinus at the base very

narrow, with short scattered setæ on the nerves and veins above and beneath; often more than 1 ft. diam.; petiole 6 in. or more. Male flowers in long racemose panicles; bracts linear-subulate, setose-ciliate. Female flowers on short, patent pedicels. I have not seen the fruit.—*Cocculus palmatus*, Hook. Bot. Mag. 2970–71, non DC.—*Jateorhiza palmata*, Miers, l. c.

Mozamb. Distr. Mozambique (also in Madagascar, *Bojer*). I have only seen cultivated specimens.

This plant may prove to be a variety of *J. Columba*, but the few specimens which I have seen would scarcely warrant their being united at present. As the specific name *palmata* has been applied both to this species and the foregoing, I have thought it better to sink it altogether to avoid further confusion.

3. TINOSPORA, Miers; Benth. et Hook. f. Gen. Pl. i. 34.

Sepals 6, in 2 series; 3 inner larger. Petals 6, shorter than the inner sepals, shortly narrowed to the base. Male fl.: Stamens 6, free; anthers ovoid or oblong-ovoid, 2-locular, dehiscing longitudinally. Female fl.: Staminodia 6. Carpels 3, with torn stigmas. Drupes ovoid or plano-convex, with the scar of the stigma near the apex; putamen slightly concave on the inner face. Seed meniscoid; albumen fleshy, ruminate. Embryo rather curved, with laterally divaricate cotyledons.—Climbing shrubs. Leaves usually cordate. Racemes simple, slender, axillary or terminal, with fascicled or solitary flowers.

A small genus, with 4 Asiatic, 2 Australian, and 1 African species. The description of the female flower and fruit is from the 'Genera Plantarum.'

1. **T. Bakis,** *Miers in Ann. Nat. Hist. Ser.* 2. vii. 38. A climber, with usually more or less verrucose thick and fleshy bark; glabrous or the annual shoots very thinly or obsoletely pubescent. Leaves cordate, acute or obtuse, entire, glabrous, somewhat coriaceous or rather fleshy, in our specimens not exceeding 1½ in. in breadth, on petioles of about half their length. Racemes simple, axillary or terminating lateral, leafy shoots. Flowers fascicled or solitary, in the axils of minute, subulate or lanceolate, glabrous bracts. Male flowers with the inner sepals spreading, shortly narrowed to the base. Filaments not thickened above. Female flowers and fruit I have not seen.—*Cocculus Bakis*, Rich. in Fl. Seneg. 12. t. 4.

Upper Guinea. Senegambia, *Leprieur and Heudelot!*

Nile Land. Sennar, *Kotschy!*

Probably to this species, as imperfect specimen, with ♂ fl., from the Zambesi country (*Dr. Kirk*), may be referred. The filaments appear to be adherent below to their opposed petals, but this is uncertain. It is described under the name of *T. tenera*, by Mr. Miers (Ann. Nat. Hist. Ser. 3. xiii. 322).

4. TILIACORA, Colebrooke; Benth. et Hook. f. Gen. Pl. i. 36.

Sepals 6, in two series, 3 outer smaller, inner valvate or scarcely imbricate. Petals 6, shorter than the inner sepals, cuneate or unguiculate. Male fl.: Stamens 6, free or connate below; anthers bilocular, dehiscing longitudinally. Female fl.: Carpels 9–12; styles subulate. Drupes stipitate, obovate, laterally compressed, the scar of the style near the hilum. Putamen sulcate. Seed

curved; embryo nearly the length of the seed, with fleshy appressed cotyledons in a ruminate albumen.—Leaves more or less ovate. Inflorescence in paniculate racemes.

The original and only species of the genus besides the following is a widely-diffused Indian plant.

1. **T.? funifera,** *Oliv.* Leafy extremities glabrous. Leaves ovate-oblong or ovate-lanceolate, acute or acuminate, coriaceous, 3-nerved, 3–4 in. long, 1½–2 in. broad. Petiole ½–1 in. Inflorescence from nodes on the old wood. Male flowers in fasciculate, pubescent racemes about 2 in. long. Pedicels bearing 3–9 sessile flowers, 1–1½ lines long. Bracts lanceolate, much shorter than the pedicels. Three inner sepals valvate, obovate-elliptical. Petals half as long as the inner sepals, ovate-cordate, unguiculate, with thickened margins. Male fl.: Stamens 6, free nearly from the base (or connate below, *Dr. Kirk*); anthers small, ovoid, adnate, 2-celled, the cells divergent below and dehiscing longitudinally. Female flowers not seen; according to Dr. Kirk with about 12 carpels upon a central gynophore.

South Central. Victoria Falls, *Dr. Kirk!*
Mozamb. Distr. Zambesia, *Drs. Kirk and Meller!*
I believe this plant to be the same as indicated by Mr. Miers (Ann. Nat. Hist. Ser. 3. xiv. 364) as a species of *Hypserpa* (*H. funifera*), but as Dr. Kirk describes the carpels as about 12 in number, it appears more nearly allied to *Tiliacora*, as suggested by Dr. Kirk. Dr. Meller describes this plant as reaching a height of 30 or 40 ft., and "everywhere thickly loaded with flowers."

5. COCCULUS, DC.; Benth. et Hook. f. Gen. Pl. i. 36.

Sepals 6, in two series, 3 inner larger. Petals 6, shorter than the inner sepals, entire or bidentate, concave or with involute margins embracing the stamens. Male fl.: Stamens 6, free, with 4-lobed anthers. Female fl.: Staminodia 6 or 0. Carpels 3, with erect or recurved undivided styles. Drupes rotundate or obovate, compressed, with the scar of the style near the base. Putamen tuberculate or transversely rugose. Seed horseshoe-shaped, curved around opposite intruded processes of the putamen; embryo with linear, appressed cotyledons in a small quantity of fleshy albumen.—Climbers or rarely nearly erect. Leaves various in form but not peltate and rarely cordate. Flowers fascicled or solitary, cymose or paniculate, axillary.

The two tropical African species have a wide distribution in the hotter parts of Asia, where a few other species of the genus are also indigenous. Two species are American.

Ramuli glabrous or nearly so. Leaves usually with a cuneate base, glabrous or puberulous at first. Apex of the petals undivided . . . . 1. *C. Leæba.*
Ramuli pilose or hoary-tomentose. Leaves usually truncate, broadly rounded or even cordate at the base, pilose or pubescent. Petals bidentate 2. *C. villosus.*

1. **C. Leæba,** *DC. Syst. Veg.* i. 529. A much-branched climber with slender glabrous or glabrate, striate, pale or ashen, leafy ramuli. Leaves small, rather coriaceous, lanceolate-oblong or -ovate or obtusely trapezoidal, entire or sometimes obscurely lobed, usually obtuse, rarely retuse, mucronate, cuneate or rather rounded at the base, glabrous or puberulous at first, more or less glaucous, ½–1½ in. long, ¼–¾ in. broad. Petiole 1–3 lines. Flowers

small, axillary, the males fascicled, sessile or shortly pedicellate, the females solitary or in pairs on pedicels of 2–4 lines.—*C. ellipticus*, DC. Syst. Veg. i. 526.

Upper Guinea. Senegambia, *Perrottet, Heudelot!*
North Central. Kouka, *E. Vogel!*
Nile Land. Sennar, *Kotschy!*
A variable plant with a very wide range, extending from the arid regions of India and Afghanistan, through Arabia and Egypt, to the Cape Verd Islands.
For synonymy, see 'Flora Indica,' i. 192, of Drs. Hooker and Thomson.

2. **C. villosus,** *DC. Syst. Veg.* i. 525. Leaves ovate-oblong or elliptical or subdeltoid or even cordate, obtuse or retuse and minutely mucronate, rarely acute, younger leaves more or less pilose or softly pubescent, on the ramuli ¾–2 in. long, ½–1½ in. broad. Petiole 1–3 lines. Male flowers fascicled, sessile or shortly panicled. Females usually fascicled or solitary, subsessile, shortly pedicellate or rarely racemose.—*Holopeira torrida*, Miers in Ann. Nat. Hist. Ser. 3. xix. 29.

Mozamb. Distr. Shire river, above the cataracts, *Dr. Kirk!*
A very common and widely-spread species in India. It occurs also in extratropical Western Africa (*Curror*).

6. CISSAMPELOS, Linn.; Benth. et Hook. f. Gen. Pl. i. 37.

Male fl.: Sepals 4 (or 5). Petals 4 or fewer, much shorter than the sepals, united into an entire or divided cup-shaped corolla; anthers 2–5, united into a peltate (4–10-lobulate) disk, polliniferous and dehiscing around the margin. Female fl.: Sepal (or bracteole) 1, subtending a single entire or 2-lobed petal (or sepal). Carpel solitary, with a 3-fid or 3-dentate or sometimes irregularly-cut style. Drupe compressed or subglobose, with the scar of the style near to the hilum. Putamen compressed, the margin tubercled, the sides depressed with a transverse process extending across the inside of the base of the cavity. Seed horseshoe-shaped, curved around the intruded process of the putamen; embryo linear, with appressed cotyledons, in a small quantity of albumen.—Climbers. Leaves usually cordate or reniform. Male flowers cymose; female racemose, often clustered in the axils of leafy bracts.

A genus principally confined to the tropics, widely spreading in both hemispheres.

Pubescent tomentose or rarely glabrate. Leaves with the sinus deepest at the insertion of the petiole (or peltate). Male flowers pilose	1. *C. Pareira.*
Glabrous or nearly so. Leaves with the lamina usually slightly produced to the petiole in the middle of the sinus. Male flowers glabrous or subglabrous	2. *C. torulosa.*
Leaves peltate, glabrous, rather shining and reticulate above, paler and puberulous beneath. Pedicels pilose	3. *C. insolita.*

1. **C. Pareira,** *Linn.; DC. Prod.* i. 100. Leaves reniform-cordate, cordate or rotundate-deltoid, entire or rotundate and broadly and obscurely lobed, pubescent, shortly pilose or tomentose or sometimes nearly glabrous, at least above, usually obtuse and mucronate or emarginate, cordate at the base, with the petiole inserted at the base of the sinus, or more or less distinctly peltate and truncate. Male flowers minute, in many-flowered axillary

or slightly extra-axillary cymes or small cymose panicles. Female inflorescence racemose, the flowers on very short pedicels, clustered in the axils of rotundate cordate or reniform leafy bracts. Drupes pilose or glabrate.—*C. mucronata*, Rich. in Fl. Seneg. i. 11. *C. Vogelii*, Miers in Fl. Nigrit. 214. *C. comata*, Miers, l. c. 215. *C. macrostachya*, Klotzsch in Peters' Mossamb. 172. *C. senensis* and *C. hirta*, Klotzsch, l. c. *C. aristolochiæfolia*, Fenzl in Flora, 1844, 312.

For extended synonymy, see 'Flora Indica,' i. 198, of Drs. Hooker and Thomson, or Eichler in Martius' Fl. Brasiliensis, Menisp. 188.

Upper Guinea. Senegambia, *Heudelot!* etc. Nigritania, *E. Vogel!*
North Central. Bornu, *E. Vogel!*
Nile Land. Sennar, *Kotschy!*
South Central, *Baines!*
Mozamb. Distr. Zambesia, *Dr. Kirk!*

Var. *owariensis* (*C. owariensis*, Beauv.; DC. Prod. i. 100). Leaves usually obscurely 3- or even 5-angled, the lobes broad, obscure, and mucronulate; distinctly peltate. Bracts rather large, reticulate, ½–1 in. diam., broadly ciliate.

Lagos, etc., *Barter!* Fernando Po, *Mann!* Congo, *Smith!* (*C. hirta*, Miers in Ann. Nat. Hist. Ser. 3. xvii. 136, a variety with patent hairs on the stem and petioles.) *C. zairensis*, Miers, l. c., I think may also be a form of *C. Pareira*.

Widely diffused throughout tropical America and Asia. It occurs at Natal.

2. **C. torulosa,** *E. Mey. in Herb. Drege.* A slender climber. Leaves reniform, with a very broad sinus or sometimes nearly truncate, and then semiorbicular; the petiole usually inserted in a more or less produced often cuneate central portion of the sinus, often slightly within the margin. Male cymes on filiform peduncles.

Mozamb. Distr. Moramballa, 3000 ft., *Dr. Kirk!*

Occurs also in the eastern districts of the Cape and at Natal. Perhaps a variety of *C. Pareira*.

3. **C. insolita,** *Miers in Ann. Nat. Hist. Ser.* 3. xvii. 136. A slender climber. Leaves peltate, rotundate- or deltoid-cordate, acute obtuse or shortly acuminate, firmly membranous, glabrous, rather shining and reticulated above, paler and minutely puberulous beneath, 3–4 in. broad, on slender petioles of 1½ 2 in. Male flowers in slender, axillary, somewhat cymose, pubescent panicles, 1½–2 in. long in our specimens. Bracts and bracteoles minute. Female flowers and fruit unknown.

Upper Guinea. Corisco Bay, *Mann!*

7. STEPHANIA, Lour.; Benth. et Hook. f. Gen. Pl. i. 37.

Sepals of the male flowers 6 (or more), in two series; of the female flowers 3 (or 4). Petals 3(-5), free, shorter than the sepals. Male fl.: Anthers 6, united into a peltate polliniferous disk, continuous round the margin in dehiscence, supported upon a short column. Female fl.: Carpel solitary, with 3 short, divergent, linear styles. Drupes compressed, with the scar of the style near to the base. Putamen tuberculed or transversely ridged. Embryo linear, horseshoe-shaped, with appressed cotyledons, in a small quantity of albumen.—Leaves usually peltate. Flowers umbellate or (in *S.? latifolia*) in long slender panicles.

A small genus of 3 or 4 species, confined to the Eastern hemisphere. The description of the embryo is from the Gen. Plantarum.

Leaves entire or nearly so. Flowers in compound umbels, usually shorter than the leaves . . . . . 1. *S. abyssinica.*
Leaves crenately undulate. Flowers in long racemose (3-pinnate) panicles, exceeding the leaves . . . . . 2. *S.? lætificata.*

1. **S. abyssinica,** *Rich. Fl. Abyss.* i. 9. *t.* 4 (*Stenaphia*). A twining or climbing shrub with subdeltoid rotundate or ovate, acute or obtuse, peltate, glabrous leaves, entire or undulate, paler or somewhat glaucous beneath, usually 1¼–2½(–5) in. broad, 1½–4(–5) in. long. Petiole ¾–2 in. Peduncles axillary, short or sometimes equalling the leaves. Umbels twice or thrice compound. Petals 3 or 4, shorter than the inner sepals, broadly obovate or transversely rhomboid-elliptical, varying in breadth.—*Clypea abyssinica*, Dill. et Rich. in Ann. Sc. Nat. Ser. 2. xiv. 38. *Cissampelos nymphæfolius*, Br. in Salt. App. 65. *Menispermum (Cocculus) Schimperi*, Hochst. in Pl. Schimp. Abyss. *Ileocarpus Schimperi*, Miers in Ann. Nat. Hist. Ser. 3. xiv. 373.

Upper Guinea. Clarence Peak, Fernando Po, 3–5000 ft. (*S. lævigata*, Miers in Ann. Nat. Hist. Ser. 3. xviii. 16), *Mann!* Camaroons mountain, 7000 ft. (*S. bullulata*, Miers, l. c.), *Mann!*

Nile Land. Abyssinia, *Dillon and Petit!* and others.

It is very nearly allied to *S. rotunda*, Lour., as well as to *S. hernandifolia*, Walp., with the latter of which it is united in the 'Flora Indica.' The inflorescence, however, is that of *S. rotunda*.

The portion of the endocarp around which the seed is curved (condyle) in *S. hernandifolia* is usually minutely perforate, though sometimes the orifice is entirely obliterated. The latter is the case in the tropical African fruits (both Abyssinian and Western) which I have examined, but it is also the case occasionally in Indian specimens of *S. hernandifolia* (Cachar, Drs. Hooker and Thomson). Upon this distinction Mr. Miers chiefly bases his genus *Ileocarpus*.

2. **S.? lætificata,** *Miers (Perichasma) in Ann. Nat. Hist. Ser.* 3. xviii. 22. A widely spreading climber, the branches loosely pilose, with long spreading hairs. Leaves ovate or rotundate-ovate, peltate, obtuse or rather acute, apiculate, undulate-crenate, laxly ciliate, glabrous or with a few hairs on the midrib above; paler or glaucescent, pilose, at length glabrescent beneath; 4–5 in. broad, 5–6 in. long. Petiole with a few long loose hairs or glabrous, 3–5 in. long. Male flowers shortly pedicellate, in long, slender, axillary panicles nearly twice as long as the leaves, with lateral branches of 1–2 in., more or less puberulous, minute. Sepals 6, 3 outer rather shorter, 3 inner obovate. Petals 3, shorter than the inner sepals, rather thick, rotundate. Anthers peltate-capitate, the outer margin of the polliniferous disk patelliform after dehiscence. Female flowers and fruit unknown.

Upper Guinea. Fernando Po, *Mann!*

From the resemblance of the male flowers to those of a true *Stephania*, this plant may well be left here until the fruit be obtained.

GENERA IMPERFECTLY KNOWN.

8. **RHIGIOCARYA,** Miers in Ann. Nat. Hist. Ser. 3. xiv. 100.

In Mr. Barter's Niger collections there is a very imperfect specimen in

fruit, which Mr. Miers has described under the above name. Neither ♂ nor ♀ flowers have been seen. The few drupes which we have are all loose, and whether solitary or several to each flower is doubtful. They are oblong-ellipsoidal, slightly compressed, about 7 lines long and 4–5 lines broad. The outer layer of the back of the pericarp resolves itself in decay into a closely echinate surface, hence the name. The seed is oval-oblong, meniscoid; the condyle nearly as long as the seed, with a cavity of 3 lines. Mr. Miers describes the seed as albuminous and the embryo with divaricate cotyledons. The solitary leaf is cordate and about 5 in. broad; the inflorescence a raceme of about the same length. This plant may be a *Tinospora* or, perhaps, and more probably, *Chasmanthera nervosa*, Miers.

9. TRICLISIA, Benth. in Benth. et Hook. f. Gen. Pl. i. 39.

Sepals 9–15, 6–12 outer imbricate in 2–4 series, successively larger, the outermost minute, 3 (or 6) inner sepals larger, valvate in æstivation. Petals 0 (or 6, reduced to minute teeth). Male fl.: Stamens 6 or 3, free; the anthers incurved bilocular apiculate or muticous, the cells divergent or nearly parallel, dehiscing longitudinally. Rudiment of the ovary reduced to a fascicle of hairs. Female flowers not seen. Drupes (only known in one imperfect specimen, probably numerous, "3?" according to Mr. Bentham) obliquely ovoid, scarcely compressed, scar of the style lateral (or nearly terminal?). Putamen bony, neither chambered nor intruded excepting as a slightly prominent transverse ridge across the inner face at the hilum. Seed, according to Mr. Bentham, reniform, exalbuminous; embryo with fleshy, semicylindrical, nearly conferruminate cotyledons.—Climbers. Leaves broadly ovate cordate or orbicular. Flowers pilose externally, paniculate cymose or densely clustered in the axils of the leaves.

A genus based upon the four following imperfectly-known species. Female flowers have not been seen in any of them, and loose drupes of but one have been described, so that additional specimens may materially modify their relations to each other.

Stamens of male flowers 6; free.

Leaves ample, ovate-cordate, acuminate. Male flowers in very short often fasciculate racemes or cymes. Three inner sepals valvate . . 1. *T. macrophylla.*

Leaves broadly elliptical or rotundate, mucronate or subacute; base slightly cordate or broadly rounded, entire. Male flowers apparently sessile, closely fascicled. Three inner sepals valvate . . . . . 2. *T. subcordata.*

Leaves orbicular or broadly elliptical, shortly apiculate or emarginate; base rounded or truncate. Male flowers in dense axillary fascicles. Six inner sepals valvate, in two series, nearly equal . . . . . 3. *T. coriacea.*

Stamens of male flowers 3.

Leaves broadly elliptical or ovate; base cuneate or rounded. Male flowers paniculate . . . . . 4. *T.? patens.*

1. **T. macrophylla,** *Oliv.* Young branches with a deciduous, rusty, appressed pubescence. Leaves rather coriaceous, at length glabrous excepting on the rusty very prominent nerves beneath; 6–10 in. long, 4½–7 in. broad. Petioles thickened and usually abruptly curved at the top, 1–2 in. long. Male fl.: imbricating sepals about 12, outer very minute; inner

valvate sepals erect, recurved at the apex. Female flowers and fruit unknown.

Upper Guinea. Fernando Po, *Mann!*

2. **T. subcordata,** *Oliv.* Extremities and young leafy shoots rusty-pilose. Leaves rather coriaceous, 3–4½ in. long, 2¼–3½ in. broad, on petioles of ½–1½ in., pilose at first, glabrescent; nerves pilose beneath. Male fl.: imbricating sepals about 12, outer minute; inner valvate sepals ovate-rotundate (in bud), very thick, concave. Fruit nearly sessile. Drupes closely clustered, tomentose, the back convex, obscurely longitudinally ridged.

Upper Guinea. Abbeokuta, and Nupe on the Niger, *Barter!*

3. **T. coriacea,** *Oliv.* Branches pilose-pubescent with appressed hairs, at length glabrous. Leaves rigidly coriaceous, glabrous above except sometimes the midrib; nerves very prominent beneath, pilose-pubescent; 2–3 in. long, 1½–2½ in. broad. Petioles ½–1 in. Outer imbricate sepals 12. Female flower and fruit unknown.

Upper Guinea. Fernando Po, *Mann!*

4. **T.? patens,** *Oliv.* Extremities hoary with minute appressed pubescence. Leaves rather coriaceous, shortly acuminate or apiculate, usually broadly cuneate at the base, glabrate; nerves puberulous beneath; 4–5 in. long, 2–3 in. broad. Petioles 1–3 in. Male panicles from shoots of the previous season, 1½–2 in. long, spreading, many-flowered, minutely pubescent. Outer imbricate sepals about 6, three inner valvate sepals spreading or recurved above. Filaments erect, slightly thickened at the apex; anthers apiculate with divergent cells. Female flower and fruit unknown.

Upper Guinea. Bagroo river, *Mann!*

10. **SYNCLISIA,** Benth. in Benth. et Hook. f. Gen. Pl. i. 36.

Sepals 6, in 2 series, the 3 outer lanceolate or linear, 3 inner 2 or 3 times as long, closely valvate or connate (according to Mr. Bentham), resembling an urceolate corolla, the apices free. Petals 6? minute, orbicular. Male fl.: Stamens 6 or 9; filaments rather thick or clavate, more or less connate at the base; anthers ovoid, 2-locular, dehiscing widely, laterally and longitudinally. Female flowers and fruit unknown.—A slender climber, with rather rigid, scabrous, ovate-cordate, acuminate leaves, and axillary, pedicellate, male flowers.

The male flowers only being known, the position of this genus in the Order remains uncertain. It is assigned, with doubt, to *Cocculeæ* by Mr. Bentham.

1. **S. scabrida,** *Miers in Ann. Nat. Hist. Ser.* 3. xx. 171. A climber, with slender flagelliform branches, at first pilose or sparsely pubescent. Leaves rather rigid, cordate-ovate or cordate, acuminate, entire, with the nerves depressed above prominent beneath, scabrous or sparsely hispid, at length somewhat shining above, more or less shortly hispid below, 2–4 in. long, 1¼–2 in. broad, on pilose petioles of ½–1 in. to which the blade is attached at a sharp angle. Male flowers about 3 lines long, axillary, solitary or in

pairs, on pedicels of ¼–1 in., with 3 or 4 minute bracteoles around the calyx.

Upper Guinea. Gaboon river, *Mann!*
Lower Guinea. Congo, *Smith!*

11. **PENIANTHUS,** Miers in Ann. Nat. Hist. Ser. 3. xiii. 124.

A glabrous shrub of 12–15 ft., with rather large, firmly membranous, oblanceolate or narrowly obovate acuminate leaves, 6–11 in. long and 2–4 in. broad above the middle, on petioles 1–2 in. long, thickened at both extremities and curved at the apex. The female flowers are in shortly pedunculate, axillary or slightly extra-axillary umbels. Sepals 6; 3 outer smaller. Petals 0. Staminodia 6, each bearing a minute sterile anther. Carpels 3, pubescent; stigmas sessile, obtuse, papillose. Male flowers and fruit unknown. —Upon this material, all referable to one species (*P. longifolius*, Miers, l. c.), the genus *Penianthus* is based.

Upper Guinea. Fernando Po, *Mann!*

12. **SYRRHONEMA,** Miers in Ann. Nat. Hist. Ser. 3. xiii. 124.

A climbing shrub, with pilose-pubescent leafy branches, about the thickness of a quill. Leaves broadly ovate-rotundate, slightly cordate or entire at the base, shortly and acutely acuminate or apiculate, glabrescent and rather rough to the touch above from the almost microscopic reticulation of the veins (when dry), shortly tomentose or pubescent and paler beneath, 2½–3½ in. broad; petioles 1½–2 in., curved at the apex. Male flowers in axillary fascicles, on pedicels of 2–4 lines. Sepals about 9, imbricate; the outer smaller. Petals 0. Stamens 3, connate below; filaments broader above, exserted; anthers minute, 4-lobed on the apex and inner face of the filament (in one flower stamens 6, two imperfect). Female flower and fruit unknown. We have but a single specimen of a single species (*S. fasciculatum*, Miers, l. c.).

Upper Guinea. Fernando Po, *Mann!*

Order V. BERBERIDACEÆ (by Prof. Oliver).

Tribe Berbereæ.

Flowers hermaphrodite. Sepals petaloid, usually 3–6 9, and petals 6 or more, fewer or 0, free, hypogynous, early deciduous, all or the inner imbricate in æstivation. Stamens usually 6 or 4, free, hypogynous, opposite to the petals; anthers erect, 2-celled, usually dehiscing by valves. Pistil of a solitary, free carpel; ovary 1-celled; stigma usually with a peltate, discoid or dilated stigma, sessile or with a short style. Ovules few, basal or several on the ventral suture, anatropous. Fruit an indehiscent drupe in the only African species.—Shrubs or herbs. Leaves alternate fasciculate or radical, simple (unifoliolate) or compound. Flowers racemose paniculate cymose or solitary, usually yellow or white.

Natives of cold and temperate countries, within the tropics principally confined to elevated regions.

1. BERBERIS, Linn.; Benth. et Hook. f. Gen. Pl. i. 43.

Sepals 6–9, petaloid. Petals 6, about the same size or little smaller than the sepals. Stamens 6; anthers dehiscing upwards in two valves; stigma peltate. Ovules few, erect.—Shrubs with the first leaves of the shoots often reduced to spines, bearing the fasciculate 1-foliolate leaves in their axils. Flowers yellow, racemose, fasciculate or solitary.

A large genus in temperate climates, absent from the Cape and Australia.

1. **B. aristata,** *DC. Syst. Veg.* ii. 8. Leaves coriaceous, more or less persistent, usually obovate or oblanceolate, spinulose-serrate or entire, variable in size, in our specimens 1 in. long or less, sometimes much longer. Flowers in pendulous or suberect racemes or cymes. Stigma of ovary and blackish fruit supported upon a short style.—*B. tinctoria,* Lesch. in Mem. Mus. ix. 306; Rich. Fl. Abyss. i. 10.

Nile Land. Abyssinia, *Dr. Roth! Petit.*

This shrub, the only representative of the Order known to me in tropical Africa, is abundant in the Himalaya, occurring also in the mountains of the Indian peninsula and Ceylon. It is very closely allied to the common Barberry (*B. vulgaris*), which differs principally in its sessile stigma. For synonymy, see Hook. f. et Thoms. 'Flora Indica,' i. 222.

ORDER VI. NYMPHÆACEÆ (by Prof. Oliver).

Flowers mostly large, hermaphrodite. Sepals 3–6, free or united at the base and adherent to the receptacle, in which the carpels are immersed. Petals 3 or indefinite; the inner smaller and often passing gradually into the stamens. Stamens indefinite, hypogynous, perigynous or almost epigynous, according to the extent to which the ovaries are immersed in the receptacle, upon the sides of which the stamens are inserted; filaments subulate or petaloid; anthers adnate, 2-celled, introrse and dehiscing longitudinally in the African species. Carpels numerous (3–∞), free or immersed in the receptacle, forming a spuriously syncarpous pistil; stigmas linear, radiating, incurved or consolidated. Ovules 2–3, or ∞, covering the walls of the ovaries, anatropous. Fruit more or less spongy and baccate, multilocular, indehiscent, or carpels distinct. Seeds with a double albumen (perisperm and endosperm) and minute embryo.—Aquatic plants, with prostrate, rooting rhizomes, floating usually large and orbicular leaves, and very handsome flowers.

A small family, represented in temperate and tropical regions of both hemispheres. As is often the case with water-plants, some of the species are very widely diffused and very variable, and enjoy in consequence a proportionally extended synonymy.

Sepals 3. Carpels free . . . . . 1. BRASENIA.
Sepals 4. Carpels ∞, consolidated . . . . . 2. NYMPHÆA.

1. BRASENIA, Schreber; Benth. et Hook. f. Gen. Pl. i. 46.

Sepals 3. Petals 3. Stamens 12–18; filaments subulate. Carpels free;

in fruit coriaceous, 1-(or 2-)seeded.—Herbs, with floating, entire, peltate leaves. Flowers rather small.

1. **B. peltata,** *Pursh, Fl. Bor. Am.* ii. 389. Leaves usually broadly elliptical and rounded at each end, 2–3½ in. long, 1½–2 in. broad. Flowers axillary, ½–1 in. diam., pedunculate, purple.—A. Gray, Gen. i. 39. *Hydropeltis purpurea,* Michx.; DC. Prod. i. 112.

Lower Guinea. Angola, prov. Huilla, *Dr. Welwitsch!*

The only species of the genus, very widely distributed, occurring in N. America, India, and Australia.

2. **NYMPHÆA,** Linn.; Benth. et Hook. f. Gen. Pl. i. 46.

Sepals 4. Petals indefinite, from 5 or 6–20 or more, in 2 or more series. Stamens indefinite, 12–60, inserted with the petals upon the sides of the receptacle. Ovary many-celled, with radiating sessile stigmas. Fruits coriaceous or spongy; seeds indefinite, immersed in pulp.—Rhizome perennial. Leaves deeply cordate, floating, with prominent radiating nerves beneath, on long petioles. Flowers white blue or red, 1 or 2–10 in. or more in diam.

To this beautiful genus belongs the White Water-lily of Europe and the north temperate zone.

Connective of the anthers not (or but exceptionally) produced beyond the cells, obtuse or scarcely acute . . . . . 1. *N. Lotus.*
Connective of the anthers more or less distinctly produced beyond the cells into an acute or obtuse appendix . . . . . 2. *N. stellata.*

1. **N. Lotus,** *Linn. Sp. Pl.* 729. Leaves sinuate-dentate, rarely nearly entire, with a deep, open or nearly closed sinus, more or less sagittate when young, pubescent or nearly glabrous beneath. Flowers 2–10 in. diam., white rose or purple. The rays of the stigma with somewhat clavate extremities.—Bot. Mag. 1280, 1364, 4665 (*N. Devoniensis*). *N. dentata,* Schum. et Thonn. Guin. Pl. 249. For extended synonymy, see 'Flora Indica,' i. 241.

Upper Guinea. Senegambia, *Perrottet, Brunner!* Oware, *P. de Beauvois;* Niger, *Barter!* Fernando Po and Nun river, *Mann!* Old Calabar, *Thomson!*

North Central. Tubosi Lake, *E. Vogel!*

Nile Land. Nile, 2° N. lat., *Speke and Grant!* Kordofan, etc., *Webb, Frag. Fl. Æth.* 11.

Lower Guinea. Congo, *Dr. Welwitsch!*

Mozamb. Distr. Lake Nyassa, *Dr. Kirk!*

Occurs also in India and the Indian Archipelago, in S.E. Europe, N. Africa, and Madagascar.

2. **N. stellata,** *Willd. Sp. Pl.* ii. 1153. Leaves orbicular or broadly elliptical, sinuate-dentate, repand or entire, with a deep sinus, usually glabrous, occasionally producing leafy buds at the base. Flowers very variable in size, 1–10 in. diam., white blue purple or rose, fragrant or inodorous. Stigmatic rays short. Seeds ellipsoid-globose, minutely longitudinally striate or nearly or quite smooth.—Bot. Mag. 552, 1189, 2058. *N. cærulea,* Sav.; DC. Syst. Veg. ii. 50. *N. guineensis,* Schum. et Thonn. Guin. Pl. 248. *N. maculata,* Schum. et Thonn. l. c. 247. *N. rufescens, N. micrantha,* and *N. abbreviata,* Guill. et Perr. Fl. Seneg. 15, 16. *N. Heudelotii,* Planch.

Études Nymph. in Ann. Sc. Nat. Ser. 3. xix. 41. *N. scutifolia*, DC. Syst. Veg. ii. 50. *N. capensis*, Thunb. Fl. Cap. 431. *N. Petersiana*, Klotzsch in Peters' Mossamb. 152. For further synonymy, see 'Flora Indica,' i. 243.

Upper Guinea. Senegambia, *Perrottet! Brunner!*, etc.; Niger, *Barter!*
Nile Land. Abyssinia, *Dillon*, etc.; Kordofan, *Kotschy!* Upper Nile and Egypt (*Schweinf. et Asch. Enum.*); Lake Karague and Upper Nile, *Speke and Grant!*
Lower Guinea. Angola, *Dr. Welwitsch!*
South Central, *Chapman and Baines!*
Mozamb. Distr. Lake Nyassa, Shire, and Zambesi, *Dr. Kirk!*

The smoothness of the seeds of the small-flowered form, named *N. Heudelotii*, by M. Planchon, does not appear to me to be a character of much importance. I find them nearly as smooth in an Indian specimen of *N. stellata*.

Occurs in rivers, lakes, and tanks in extratropical Africa, both north and south, and in Madagascar. It is very common in India, and extends to the Archipelago.

Order VII. PAPAVERACEÆ (by Prof. Oliver).

Suborder I. Papavereæ.

Flowers hermaphrodite, regular, fugacious. Sepals 2 or 3, free, caducous. Petals 4 or 6, hypogynous, free, imbricate and usually crumpled in æstivation. Stamens indefinite, free. Filaments filiform; anthers innate, 2-celled, dehiscing longitudinally. Pistil syncarpous; ovary superior, 1-celled with 2 to many parietal placentas, sometimes projecting nearly to the centre of the ovary; ovules indefinite, anatropous. Fruit a capsule, usually dehiscing by valves or pores, many-seeded. Seeds albuminous with a minute embryo.—Herbs or rarely shrubs with a milky or coloured juice. Leaves alternate or radical, simple or pinnatifid, exstipulate. Flowers usually solitary and terminal, red white or yellow.

Natives chiefly of the north temperate zone. Several species are common weeds of cultivation.

Placentas (4–∞) usually projecting far into the cavity of the capsule. Capsule dehiscing by pores around the top . . . . . 1. Papaver.
Placentas (4–6) nerviform, not projecting into the capsule. Capsule dehiscing by short valves from the top . . . . . 2. Argemone.

1. PAPAVER, Linn.; Benth. et Hook. f. Gen. Pl. i. 51.

Sepals 2 or 3. Petals 4 or 6. Stamens indefinite. Ovary globose ovoid or clavate; stigmas 4–∞, radiating, sessile. Placentas projecting into the cavity of the ovary, covered with the indefinite ovules. Capsule dehiscing by minute pores under the margin of the discoid stigmatic surface. Seeds indefinite.—Glabrous hispid or prickly, annual or perennial herbs. Peduncles 1-flowered. Flowers showy, red white or yellow, very fugacious.

The species occurring in Tropical Africa are not indigenous. One species, not known to me from Tropical Africa, is native at the Cape (*P. aculeatum*, Thunb.).

Leaves green, rarely glaucous, pinnati- or bipinnati-partite. Capsule oblong or clavate . . . . . 1. *P. dubium*.
Leaves glaucous, irregularly lobed or toothed, amplexicaul. Capsule globose . . . . . 2. *P. somniferum*.

*1. **P. dubium,** *Linn.; DC. Prod.* i. 118. A slender-branched annual, hispid or nearly or quite glabrous.

Nile Land. Abyssinia, *Schimper!*
Widely spread in waste and cultivated ground through Europe and temperate and subtropical Asia. Schweinfurth and Ascherson, in their enumeration of Nile plants, cite *P. Rhœas*, Linn., from Abyssinia. It differs from *P. dubium* in its globose capsule.

*2. **P. somniferum,** *Linn.; DC. Prod.* i. 119. An erect, glaucous, and usually glabrous annual, simple or slightly branched. Flowers large, whitish with a purple blotch at the base, or altogether purple-black. Capsule large and glabrous.

I have not actually seen specimens from Tropical Africa, but it is commonly cultivated for the sake of its milky juice (opium), and often occurs in waste places throughout the tropics of the Old World.

2. ARGEMONE, Linn.; Benth. et Hook. Gen. Pl. i. 52.

Sepals 2 or 3. Petals 4–6. Stamens indefinite. Ovary with 4–7 slender placentary lines with indefinite ovules; stigmas 4–7, very shortly stipitate, radiating. Capsule oblong, separating at the apex between the placentas into short valves or teeth, many-seeded. Seeds pitted.—Prickly, more or less glaucous, branched herbs, with pinnatifid spinose leaves and showy white or yellow flowers.

A small American genus, of which the following species occurs almost everywhere, as an introduced weed, between the tropics in the Old World.

*1. **A. mexicana,** *Linn.; DC. Prod.* i. 120. An herb with a somewhat shrubby habit, the stem glaucous, smooth or spinulose. Leaves semi-amplexicaul, pinnatifidly-lobed or sinuate, spinulose. Flowers orange or yellow. Capsule setose or sometimes unarmed.

Upper Guinea. Dahomey, *Burton!* Senegambia, *Leprieur.*
Mozamb. Distr. Zanzibar, *Speke!* Mozambique, *Peters* (Klotzsch).

Suborder II. Fumariæ.

Flowers hermaphrodite, irregular in the African species. Sepals 2, minute, resembling coloured bracteoles. Petals 4, in two pairs, connivent, one of the two outer with a saccate or spurred base, two inner cohering at their apices. Stamens 6, diadelphous, the middle stamen of each bundle with a 2-celled anther, the lateral stamens with 1-celled anthers. Pistil syncarpous. Ovary superior, 1-celled, with 2 placentas; ovules 1–∞. Style filiform; stigma lobed or nearly entire. Fruit a several-seeded capsule or an achene. Seeds with a minute embryo and copious fleshy albumen.—Weak, decumbent or climbing herbs with watery juice. Leaves alternate or rarely opposite, multipartite. Flowers white rose or yellow, in terminal or leaf-opposed racemes in the African species.

This Suborder is represented in Tropical Africa by a common and widely diffused weed of cultivation, but around the Mediterranean and at the Cape there occur some endemic forms characterized by peculiarities in the fruit or in the form of the stigma.

1. FUMARIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 56.

Fruit a small nearly globose or compressed achene.—Diffuse or climbing herbs. Leaves multisect with narrow or linear segments, glabrous and often glaucous.

Not indigenous in Tropical Africa.

*1. **F. officinalis,** *Linn.; DC. Prod.* i. 130. A pale, weak annual, diffuse, trailing or climbing. Leaves decompound with linear lanceolate or oblong, acute or obtuse, often mucronulate segments. Bracteoles shorter than or sometimes exceeding the pedicels. Flowers white rose or purplish. Achene globose, obtuse retuse or subapiculate, smooth or slightly rugose.

Var. *a.* Achenes obtuse or retuse.

Var. *b.* (*F. parviflora*, Lam.) Flowers very small (1½–3 lines). Sepals minute. Achenes somewhat pointed.

Nile Land. Cornfields, etc., Abyssinia, *Schimper! Roth! Petit.* White Nile, *Petherick!*

This species, under one or other of its forms, is widely spread through Europe and temperate Asia.

Order VIII. CRUCIFERÆ (by Prof. Oliver).

Flowers hermaphrodite, regular or the petals on the side turned from the axis larger. Sepals 4, free, the lateral pair often more or less saccate at the base or inserted a little lower than the others. Petals 4, rarely 0, narrowed below or clawed, spreading and cruciate above. Stamens usually 6, four inner ones in pairs and longer than the two outer. Ovary 1-celled with 2 parietal placentas, or more usually 2-celled owing to the development of a thin membranous septum connecting the placentas. Style simple or 0; stigma 2-fid or undivided; ovules 1, 2, or indefinite, usually horizontal or pendulous. Fruit long (*siliqua*) or short (*silicule*), 2-celled or sometimes 1-celled, dehiscing by valves which separate from their persistent, seed-bearing margins (*replum*), or indehiscent, or separating into cocci or 1-seeded articles. Seeds rarely albuminous. Embryo usually with plane or plano-convex cotyledons, the radicle either folded against their edges (accumbent o=) or against the back of one of them (incumbent o=), or the cotyledons conduplicate or doubly or spirally folded.—Herbs, sometimes shrubby with colourless often pungent juice, glabrous, glaucous, or with simple mediofixed or stellate hairs. Leaves simple, alternate, exstipulate, pinnatifid toothed or entire. Flowers racemose or corymbose at first, rarely bracteate, usually white yellow or rose.

A very large and widely dispersed Order, characteristic of the temperate and cold regions of the northern hemisphere, and especially abundant around the Mediterranean and in Asia Minor. But few genera are peculiar to the southern hemisphere. Of these the largest is *Heliophila*, restricted to S. extratropical Africa, some species of which may probably turn up north of the tropic. Many of the *Cruciferæ* are useful esculents or oil-producing plants, and are extensively cultivated in tropical as well as temperate climates.

It is probable that several peculiar genera, affecting the desert regions of Arabia and N. Africa, may extend south of the tropic of Cancer. I have given diagnoses, under their recorded tropical allies, of a few of the more likely of these.

A. Fruit usually many times (3 times or more) longer than broad, dehiscing longitudinally.

Radicle accumbent. Siliqua not appendaged (in African species).

Leaves entire or sinuate, hoary-tomentose. Flowers purplish . . 1. MATTHIOLA.
Leaves pinnate or pinnatisect. Valves of siliqua with or without a very slender midrib. Seeds usually biseriate . . . . . 2. NASTURTIUM.
Radical leaves lyrate. Valves of siliqua prominently carinate. Seeds uniseriate . . . . . 3. BARBAREA.
Leaves spathulate or oblanceolate, toothed. Valves of siliqua plane or carinate . . . . . 4. ARABIS.
Leaves pinnate or 3-foliolate (in African species). Siliqua usually slightly narrowed towards its extremities. Valves without a distinct midrib. Seeds uniseriate . . . . . 5. CARDAMINE.
Leaves entire or toothed. Flowers bracteate. Siliqua rigid, recurved above . . . . . 6. MORETTIA.
Leaves linear, entire, with appressed mediofixed hairs . . . . . 7. FARSETIA.

Siliqua with horn-like appendages or rounded auricles.

Leaves linear. Siliqua short with a pair of terminal horns . . . NOTOCERAS (p. 61).
Lower leaves pinnatifid. Siliqua with a pair of horns at the base . LONCHOPHORA (p. 61).

Radicle incumbent. Cotyledons plane.

Leaves entire or pinnatifid. Siliqua narrow-linear; valves faintly 3-nerved . . . . . 8. SISYMBRIUM.
Cotyledons twice folded transversely . . . . . HELIOPHILA (p. 65).

Cotyledons conduplicate.

Radical leaves lyrate-pinnatifid. Siliqua linear, with costate valves. Style long or short. Seeds uniseriate . . . . . 9. BRASSICA.
Radical leaves lyrate or pinnatifid. Siliqua linear; valves with a slender median nerve. Style short. Seeds subbiseriate . . . 10. DIPLOTAXIS.
Radical leaves pinnatifid. Siliqua linear-oblong, rather turgid; valves costate. Seeds biseriate . . . . . 11. ERUCA.
Leaves entire amplexicaul or pinnatifid. Flowers rose . . . . MORICANDIA (p. 67).
Leaves linear, entire. Flowers purple. Seeds broadly winged . . HENOPHYTON (p. 67).

B. Fruit short (not more than 3 times longer than broad) or broader than long, dehiscing longitudinally.

Septum as broad as the valves.

Cotyledons plane, radicle accumbent.

Leaves linear, entire, with appressed hairs . . . . . 7. FARSETIA.
Leaves oblong, petiolate. Silicule with a pair of concave auricles at the apex . . . . . ANASTATICA (p. 61).

Cotyledons conduplicate.

Silicule orbicular, compressed . . . . . SAVIGNYA (p. 67).
Silicule turgid with a foliaceous beak . . . . . CARRICHTERA (p. 67).

Septum narrow, transverse to the larger diameter of the fruit (silicules laterally compressed).

Radicle incumbent. Cotyledons plane or conduplicate.
Silicules elliptical, winged. Cotyledons conduplicate. Flowers purple . . . . . 12. SCHOUWIA.
Silicules obcordate-cuneate . . . . . 13. *CAPSELLA.
Silicules oblong or subglobose, with convex valves (minute aquatic with linear radical leaves) . . . . . 14. SUBULARIA.

Silicules oblong to obcordate. Cotyledons various, entire or 3-partite. Flowers white . . . . . 15. LEPIDIUM.
Radicle accumbent.
Seeds usually solitary in each cell . . . . . 15. LEPIDIUM.
Seeds 2–4 in each cell. Silicules obcordate to oblong . 16. THLASPI.
C. Fruit indehiscent, or the valves separating as cocci.
Fruit didymous; valves closed, separating as cocci . . . . 17. SENEBIERA.
Fruit globose, articulated to a minute, seedless, pedicel-like article 18. CRAMBE.
Fruit elongate, of two jointed articles, the lower 1–4-seeded, the upper 3–6-seeded . . . . . 19. ENARTHROCARPUS.
Shrubby. Leaves oblong, toothed. Flowers ebracteate. Fruit a bony 2-seeded nut . . . . . 20. ZILLA.
Shrubby. Leaves small, ovate or oblong, entire. Flowers bracteate. Fruit 1-seeded, winged . . . . . 21. DIPTERYGIUM.
Radical leaves lyrate. Fruit terete, many-seeded, not articulated 22. *RAPHANUS.

1. MATTHIOLA, Br.; Benth. et Hook. f. Gen. Pl. i. 67.

Sepals erect; two lateral inserted slightly lower upon the torus, and convex or saccate at the base. Petals spreading, usually with a long claw. Stigma sessile with connivent lobes, sometimes thickened or horned at the base. Siliqua long and narrow, terete or compressed, with a thick pitted septum. Seeds numerous, in one row, flattened and usually narrowly winged; radicle accumbent.—Perennials or annuals, covered with a hoary tomentum or pubescence. Leaves entire, sinuate or toothed. Flowers tolerably large, usually purple, in terminal racemes.

A genus of about 30 species, mostly confined to the shores of the Mediterranean and the West of Europe. One species occurs at the Cape.

1. **M. elliptica,** *Br.; DC. Syst. Veg.* ii. 167. A diffuse or bushy herb, hard woody and branching below, 1–2 ft. high. Leaves elliptical or ovate-lanceolate, rather acute or obtuse, obscurely dentate-sinuate or entire, narrowed into rather long slender petioles, hoary with a short stellate tomentum; lamina ¾–1½ in. long, 5–9 lines broad; petiole 4–9 lines. Pedicels short, erect, appressed. Outer sepals very slightly convex at the base. Petals broadly rotundate-obovate, gradually narrowed into a rather short, thickened claw. Stigmas converging, forming a triangular unappendaged tip to the ovary. Siliqua (not seen ripe) nearly terete, hoary, with a raised line on each side.

Nile Land. Mountains of Abyssinia, *Salt! Schimper!*
Not known from elsewhere.

2. NASTURTIUM, Br.; Benth. et Hook. f. Gen. Pl. i. 59.

Sepals short, loose or rather spreading, equal or nearly so. Petals narrowed to the base, sometimes wanting. Stamens 6 or fewer. Stigma entire or 2-lobed, subsessile or with a short style. Siliqua usually linear or narrow-oblong, nearly terete, with a membranous septum; valves nerveless or with a very slender nerve. Seeds usually 2-seriate, with short free funicles. Radicle accumbent.—Erect or diffuse, usually branching terrestrial or aquatic herbs, with pinnatifid or sometimes entire leaves and white or yellow (or lilac), ebracteate or bracteate flowers.

A considerable genus, many species of which are very variable and difficult to define; occurring in every quarter of the globe, affecting damp or wet situations.

With a distinct usually branched stem.

Leaflets distinct. Racemes short, ebracteate. Pedicels half as long or nearly as long as the siliqua . . . . . 1. *N. officinale.*

Leaf-segments confluent or decurrent. Racemes narrow, ebracteate, at length elongate. Pedicels many times shorter than the siliqua . 2. *N. indicum.*

Leaves pinnatipartite; segments toothed or pinnatifid. Flowers (very minute) in the axils of pinnatifid bracts. Pedicels many times shorter than the siliqua . . . . . 3. *N. cryptanthum.*

Acaulescent or nearly so.

Leaves pinnate; segments petiolulate. Flowers very minute, ebracteate. Pedicels many times shorter than the siliqua . . . . . 4. *N. humifusum.*

1. **N. officinale,** *Br.; DC. Syst. Veg.* ii. 188. Stem branched, often creeping, floating or ascending to 1–2 ft. or more when luxuriant or supported by other plants. Leaves pinnate; the upper with 3–7 pairs and a terminal leaflet; the latter usually larger, varying from roundish to ovate or lanceolate, obtuse, sinuate or dentate. Flowers white; the petals exceeding the sepals. Siliquas patent or curved upwards, ½–¾ in. long. Seeds in 2 rows.

Nile Land. Abyssinia, *Q. Dillon and Petit* (*Richard*).

I have not seen tropical African specimens, but the species is widely spread through the north temperate zone, occurring in India and at the Cape, probably introduced in some of its localities.

2. **N. indicum,** *Linn.; DC. Syst. Veg.* ii. 199. A branching, glabrous herb, with the upper leaves lyrately-pinnatifid; segments various, obtusely or acutely toothed or incised. Flowers ebracteate; racemes at length elongate. Siliquas terete, with smooth valves, about ½–¾ in. long, more or less spreading, 4–8 times as long as the short pedicels.—*N. niloticum,* Boiss. Diag. Ser. 1. viii. 19 (*N. Madagascariense,* DC. Syst. Veg. ii. 192 ?).

Nile Land. Sennar, *Kotschy!* Nubia, near Khartoum (*Boissier*).
Lower Guinea. Angola, *Dr. Welwitsch!*

3. **N. cryptanthum,** *Rich. Fl. Abyss.* i. 15, A diffuse, ascending or erect, branched, glabrous herb, ½–2 ft. high, tough or almost woody below. Upper leaves rather small, not exceeding 1½ in., pinnatipartite, with pinnatifid, toothed, or entire linear segments. Flowers very minute, white. Siliqua linear or linear-oblong, terete, with thin valves, 4–6 lines long and 4–6 times longer than the short pedicel, shorter than or nearly equalling the bract. Stigma undivided, nearly sessile.

Nile Land. Abyssinia, *Schimper! Petit!*

This remarkable plant may be a bracteate form of some other species.

4. **N. humifusum,** *Guill. et Perr. Fl. Seneg.* 19. A flaccid, nearly acaulescent, glabrous herb (3–8 in. high in our specimens). Leaves thin, pinnate, often interrupted or irregular, segments toothed or sinuate, on slender, often winged petiolules; rachis usually more or less winged near their insertion; terminal segment usually larger. Flowers very minute, racemose; racemes ebracteate, shorter than the leaves. Siliquas subterete, on pedicels as long as the fruit is broad, or subsessile.

Upper Guinea. Senegambia, *Heudelot! Perrottet!*
Lower Guinea. Angola, Loanda, *Dr. Welwitsch!*

N. brachypus, Webb, Frag. Fl. Æthiop. 13. A low glabrous herb; lower leaves lyrate; upper pinnate; segments crenate-dentate. Flowers minute; petals shorter than the sepals. Siliqua compressed, oblong, 5 or 6 times longer than the thickish spreading pedicel. Seeds ovoid scaly-tuberculate, deep red.

Nile Land. Sennar and Kordofan (*Webb*).

I have not seen this plant, the description of which, in abstract above, was based on a single specimen by Mr. Webb.

3. BARBAREA, Br.; Benth. et Hook. f. Gen. Pl. i. 68.

Sepals equal, erect or nearly so. Petals clawed. Siliqua narrow-linear, somewhat tetragonous owing to the prominent nerve or keel of the valves; septum membranous. Stigma entire or 2-lobed. Seeds round or oblong, compressed, not margined, in one series. Radicle accumbent.—Erect, usually branched, glabrous herbs, with a more or less angular stem. Leaves pinnatifid, usually lyrate. Flowers yellow.

*1. **B. vulgaris,** *Br.; DC. Syst. Veg.* ii. 206. An erect, rather stiff, perfectly glabrous and but slightly branched herb, often 2–3 ft. high. Leaves lyrate-pinnatifid, or the radical leaves reduced to the terminal, large, entire, sinuate or toothed segment; lateral segments of the cauline leaves often narrow-linear. Flowers numerous, in erect terminal racemes. Siliquas erect or spreading, rather crowded, 1 in. or more in length, rigid, tipped with the persistent style ½–2 lines long; pedicels about ¼ as long as the siliqua.

Nile Land. Abyssinia, *Schimper!* Probably introduced. Cultivated according to Richard, who refers his specimens to *B. præcox,* a variety of *B. vulgaris,* differing in the shorter style. In our specimen it is about 1 line long.

A common species, almost throughout the north temperate zone, occurring also in Australia.

4. ARABIS, Linn.; Benth. et Hook. f. Gen. Pl. i. 69.

Sepals rather short, equal or the lateral sepals saccate at base. Petals entire, usually clawed. Siliqua sessile, narrow-linear, elongate, compressed; the valves plane, keeled or with a midnerve; septum membranous; stigma simple or 2-lobed. Seeds usually in one series, compressed, with or without a narrow wing. Radicle accumbent.—Glabrous or pubescent herbs. Radical leaves usually more or less spathulate; cauline sessile. Flowers racemose, white or coloured, ebracteate.

A large genus, chiefly of the north temperate zone.

1. **A. alpina,** *Linn.; DC. Syst. Veg.* ii. 216. A perennial, diffuse or loosely tufted herb, 6–18 in. high, hoary with a short stellate tomentum or green and sparsely pubescent. Radical or winter leaves oblanceolate, dentate, sinuate-dentate or nearly entire; cauline often sessile, more or less amplexicaul. Flowers in terminal, erect or ascending, leafless racemes, white, rather large. Lateral sepals distinctly saccate. Siliquas ascending or spreading, longer than the spreading pedicels.—*A. cuneifolia,* Hochst. in Pl.

Schimp. Abyss. *A. albida*, Stev.; DC. Syst. Veg. ii. 217, and Rich. Fl. Abyss. i. 16.

Nile Land. Abyssinia, in mountainous situations, *Schimper! Roth!* (at an elevation of 10,000 ft., *Petit*, according to Richard).

A common and widely spread species in Europe, N. Asia, and N. America, extending within the Arctic Circle. A larger-flowered form has been distinguished as a species under the name of *A. albida*, but it does not appear to have any claim to the distinction.

5. CARDAMINE, Linn.; Benth. et Hook. f. Gen. Pl. i. 70.

Sepals equal. Petals clawed. Siliquas narrow-linear, compressed, usually narrowed at each end, with plane valves destitute of a distinct nerve or midrib, and membranous septum. Stigma simple or 2-lobed. Seeds in one series, compressed, not winged. Radicle accumbent.—Herbs glabrous or minutely pubescent, often flaccid. Leaves pinnate, pinnatisect, 3-foliolate or undivided. Flowers white or purplish, ebracteate.

A considerable genus, of temperate, alpine, and Arctic regions. But one of the following species (*C. trichocarpa*) is endemic, and it is closely allied to widely dispersed northern species.

Leaves 3-foliolate	1. *C. africana.*
Leaves pinnate or pinnatisect.	
Glabrous, 1 ft. or more. Flowers rather large, purplish. Broader leaflets petiolulate	2. *C. pratensis.*
Sparsely pilose, 6–12 in. Flowers small, white. Leaf-segments unequally crenate-serrate. Siliquas pubescent	3. *C. trichocarpa.*
Glabrous or sparsely pubescent, 3–12 in. Flowers small, white. Leaf-segments broadly toothed or entire. Siliquas glabrous	4. *C. hirsuta.*

1. **C. africana,** *Linn.; DC. Syst. Veg.* ii. 252. A decumbent or ascending, glabrous or minutely and thinly pubescent herb, often attaining 1 or 2 ft. Radical and cauline leaves or rather long petioles; leaflets more or less ovate and irregularly dentate or crenate, acute acuminate or obtuse, petiolulate. Racemes ebracteate. Flowers white. Siliquas erect or ascending, much exceeding the pedicels.

Nile Land. Abyssinia, *Q. Dillon (Richard), Dr. Roth?* (specimens imperfect).

Var. *pubescens*, Hook. f. in Journ. Linn. Soc. vii. 182.

Upper Guinea. Fernando Po, 7500 ft., *Mann!*

The same plant occurs at the Cape, in the islands of the Indian Ocean, and in the south of India.

2. **C. pratensis,** *Linn.; DC. Syst. Veg.* ii. 256. An erect herb. Leaves pinnate or pinnatipartite; segments obtuse, more or less ovate or rounded, very shortly petiolulate, of the upper leaves narrower. Raceme corymbose at first. Siliquas ascending, narrow-linear.—*C. obliqua*, Hochst. in Pl. Schimp. Abyss.; Rich. Fl. Abyss. i. 19.

Nile Land. Abyssinia, by mountain streams, *Schimper!*

A common plant in Europe, extending through northern Asia and Arctic America.

3. **C. trichocarpa,** *Hochst. Pl. Schimp.; Rich. Fl. Abyss.* i. 18. An erect, slender annual. Radical leaves lyrate-pinnate, with about 3 pairs of elliptical sessile or subsessile segments; terminal segment considerably larger,

unequally crenate-serrate. Siliquas erect, very narrow, at length sometimes nearly glabrous.

Nile Land. Abyssinia, *Petit! Schimper!*
Lower Guinea. Angola, Golungo Alto, *Dr. Welwitsch!*
Very nearly allied to an Indian plant, regarded as a form of *C. hirsuta*; by Dr. Hooker. Dr. Welwitsch found his plant always apetalous and with tetrandrous flowers.

4. **C. hirsuta,** *Linn.; DC. Syst. Veg.* ii. 259. A small, erect or ascending annual herb, often much branched or tufted at the base. Leaves pinnate; segments rounded, ovate or obovate, broadly toothed, the upper narrower, glabrous or with a few scattered hairs. Stamens often fewer than 6. Siliquas erect, on short pedicels.—*C. simensis*, Hochst. in Pl. Schimp. Abyss.

Upper Guinea. Fernando Po, 7500–8500 ft., and Camaroons mountain, 8000–10,000 ft., *Mann!*
Nile Land. Abyssinia, near Demerki, *Schimper!*
Common in nearly all temperate countries.

6. **MORETTIA,** DC.; Benth. et Hook. f. Gen. Pl. i. 70.

Sepals erect, equal. Petals narrow or linear. Siliqua nearly terete, erect, recurved above, on a short thick pedicel; valves rigid, nerved or subcarinate, somewhat septate within, tardy in dehiscing; style short; stigma 2-lobed. Seeds compressed in a single row. Radicle accumbent.—Branched, leafy, rather rigid herbs, with entire or dentate, stellate-hispid or hoary, sessile or subsessile leaves. Racemes leafy.

A small desert genus of N. Africa and Arabia.

1. **M. Philæana,** *DC. Syst. Veg.* ii. 427. A stiff, erect, hispid herb, 6–12 in. high, with divaricate leafy branches. Leaves lanceolate, linear-lanceolate or oblanceolate, rather acute or obtuse, dentate or entire, ½–1 in. long, hoary and hispid on both sides, with rough stellate hairs. Flowers in the axils of the upper leaves or extra-axillary.—Del. Fl. Ægypt. t. 33. f. 3.

Nile Land. Nubia, *Nectoux (DC. l. c.), Dr. Bromfield!*
Desert of Belama, Nubia, *Speke and Grant!* An imperfect, leafless specimen, probably of this species. Tufts of it, "rolled into spheres, blow over the sandy desert." Grows also in Arabia and N. Africa.

It is probable that the following genera allied to *Morettia*, but differing in their appendaged siliquas, may be found in the deserts north of the equator:—

Notoceras (*N. canariense*, Br.), occurring in the Canaries, N. Africa, and Arabia. It may be distinguished by its linear leaves and short siliquas, terminating in a pair of short horn-like processes.

Lonchophora, a N. African genus, has subsessile siliquas, bearing a horn-like appendage at each side of the base.

Anastatica (*A. hierochuntica*, Linn., the "Rose of Jericho"), of Arabia, Syria, and Algeria. Fruits very short, bearing a round concave auricle on each side of the broad apex, from the centre of which projects the persistent subulate style.

7. **FARSETIA,** Desv.; Benth. et Hook. f. Gen. Pl. i. 72.

Sepals erect; the lateral slightly saccate. Petals with long claws. Siliqua various in outline, from linear to orbicular, flat-compressed or turgid, with plane or convex, nerved or nerveless valves. Stigma 2-fid or capitate with a

short or long style. Seeds compressed, often winged, in 1 or 2 series. Radicle accumbent.—Branched, often virgate herbs, sometimes shrubby, often hoary with appressed hairs. Leaves linear or narrow, entire. Flowers racemose or spicate, white purple or yellow.

A genus of 15 to 25 species, inhabiting the shores of the Mediterranean, W. Asia to N. India and N. Africa.

Siliqua linear, with straight margins.
- Annual. Leaves linear-lanceolate, acute. Racemes lax, elongate. Siliqua 1–2 in.; median nerve obscure . . . . . 1. *F. grandiflora.*
- Annual. Leaves linear-lanceolate, obtuse. Siliqua with prominent median nerve . . . . . 2. *F. stenoptera.*
- Suffruticose below. Leaves narrow-linear. Flowers distant, in spicate racemes. Siliqua with faint median nerve . . . . . 3. *F. longisiliqua.*
- Suffruticose. Flowers densely spicate; buds elliptic-oblong. Sepals acute . . . . . 4. *F. Boivini.*

Siliqua linear with undulate margins. Flowers densely spicate; buds subglobose . . . . . 5. *F. ramosissima.*

Siliqua elliptic-oblong. Rigid shrub . . . . . 6. *F. ægyptiaca.*

1. **F. grandiflora,** *Fourn. in Bull. Soc. Bot.* xi. 55. A slender, erect, pale annual, with appressed mediofixed hairs, and usually ascending, virgate branches. Leaves narrow-linear, 1–3 in. long. Sepals rather acute. Stigma 2-fid. Siliquas linear, compressed, 1½–2 lines broad, erect, on very short pedicels; persistent styles 1–1⅓ lines long; valves flat, with a faint median nerve, hoary with minute appressed hairs.—*F. stenoptera,* Hohenack. Distr. Pl. Schimp. (2261).

Nile Land. Abyssinia, in mountains, *Schimper!* Kordofan, *Kotschy* (*Fournier*).
F. Jacquemontii, Hook. f. et Thoms. in Journ. Linn. Soc. v. 148, is a very near ally of this species.

2. **F. stenoptera,** *Hochst.; Fourn. in Bull. Soc. Bot.* xi. 56. Annual, virgate. Leaves linear-lanceolate, obtuse. Flowers laxly spicate, elliptic-oblong in bud, with acute, whitish sepals. Stigma 2-lamellate. Siliqua (immature) laterally curved, with a very prominent nerve.

Nile Land. Kordofan, *Kotschy* (*Fournier*).
I have not seen this plant, and borrow the description from Fournier.

3. **F. longisiliqua,** *Decaisne in Ann. Sc. Nat. Ser.* 2. iv. 69. Suffruticose, hoary with closely appressed white hairs; branches slender, rather rigid, divaricate. Leaves very narrow-linear. Flowers rather distant, in narrow, spicate racemes; buds oblong. Pedicels at length 1–2 lines, appressed or ascending. Siliquas 1 in. more or less, slightly curved outwards, linear, 1¼–1½ lines broad; valves hoary, undulate, with a faint midrib. Persistent style about 1 line long.

Nile Land. Nubia, *Schweinfurth!* and in Arabia.
I have not seen a type specimen, but take the name as I find it in the Nubian distribution of Dr. Schweinfurth. It appears to me doubtfully distinct from *F. Hamiltoniana,* Royle.

4. **F. Boivini,** *Fourn. in Bull. Soc. Bot.* xi. 56. Suffruticose, with ascending, slender branches. Leaves very narrow-linear, often convolute. Siliquas straight.

Mozamb. Distr. Zanzibar, Mombaze Island, *Boivin* (*Fournier*).
I do not know this plant or the following.

5. **F. ramosissima,** *Hochst. in Kotschy, Pl. Nub.* Leaves linear-lanceolate. Siliquas short, appressed.

Nile Land. Nubia, *Kotschy* (*Fournier*).

6. **F. ægyptiaca,** *Turr.; DC. Syst. Veg.* ii. 287. Shrubby, with repeatedly forking, rigid, terete branches, hoary with closely-appressed hairs. Leaves linear, hoary. Racemes strict, with subdistant flowers; pedicels usually from 1 to, at length, 4 lines. Calyx ½ in.; sepals somewhat connivent above. Siliqua broadly oblong-elliptical, hoary, ascending, about ¾ in. long.

Nile Land. Nubia (*Schweinf. and Asch. Enum.*).

R. Brown described in Denham and Clapperton (App. 217), under the name of *F. ? stylosa*, a plant gathered in the Sahara, with oblong or shortly oval siliquas; style equalling the breadth of the valves and 2-lobed stigma. The specimens were very imperfect, and I have not seen them.

8. SISYMBRIUM, Linn.; Benth. et Hook. f. Gen. Pl. i. 77.

Sepals equal or the lateral saccate at the base. Petals unguiculate. Siliqua narrow-linear, often elongate, terete or compressed, many-seeded; valves usually faintly 3-nerved. Septum membranous. Persistent style short; stigma undivided or minutely 2-lobed. Seeds in one or sometimes two series, not bordered, usually oblong or ellipsoidal with short free funicles. Radical incumbent.—Usually annual or biennial herbs. Radical leaves entire, lobed or pinnatifid, often rosulate. Flowers usually yellow or white.

A rather large and very difficult genus, many of the species resembling those of other genera, and often variable. Most of them belong to Europe, Western and Northern Asia, and the Himalaya. A few species occur at the Cape, as well as in America.

Radical leaves entire or dentate.
- To 6 in. or taller. Siliquas ascending, ½ in. long or more, about twice as thick as the pedicel . . . . . 1. *S. Thalianum.*
- One to 3 in. Siliquas patent or ascending, 3–4 lines long, about 2–4 times as thick as the pedicel . . . . . 2. *S. Pumilio.*

Radical leaves pinnatifid.
- Tufted, about 6 in. high. Flowering branches nearly leafless, flowering from near the base . . . . . 3. *S. falcatum.*
- Erect, simple or branched, 1–3 ft. or more.
  - Fruit pedicels about 1 line. Siliquas straight, subulate . . . 4. *S. erysimoides.*
  - Fruit pedicels ¼–½ in. or longer.
    - Leaves pinnatipartite or runcinate; cauline lanceolate, toothed, usually petiolate . . . . . 5. *S. Irio.*
    - Leaves runcinate, sessile, glaucescent . . . . . 6. *S. abyssinicum.*

1. **S. Thalianum,** *Gay et Monn. in Gaud. Fl. Helv.* iv. 348. An erect slender annual more or less hispid-pubescent below. Leaves mostly radical, oblanceolate dentate or entire; cauline few, lanceolate. Flowers very small. Siliquas very narrow-linear, on slender spreading pedicels.

Nile Land. Abyssinia, Bouahit mountain, *Schimper* (*Richard*).
Common in Europe and temperate Asia, occurring also in N. America and at the Cape.

2. **S. Pumilio,** *Oliv.* A low, often rather tufted annual, more or less hispid below. Leaves chiefly radical and rosulate, spathulate- or linear-lanceolate, entire or broadly toothed. Flowers minute. Siliquas narrow-linear, more or less spreading.—*Cardamine pusilla*, Hochst. in Pl. Schimp. Abyss.

Nile Land. Abyssinia, mountain summits, *Schimper!*

I have not seen satisfactory specimens of this plant, which may prove a form of some other species. The specific name I am obliged to change under *Sisymbrium*, as it is already occupied.

3. **S. falcatum,** *Fourn. Recherches Crucif.* 135. Tufted and branched at the base. Stems about 6 in. tall, erect or ascending. Leaves all or nearly all radical, pinnatifid, with the terminal lobe usually larger, lateral lobes obtuse or acute, sparsely pubescent or nearly glabrous, narrowed into rather long linear petioles. Flowers rather large. Siliquas narrow-linear, spreading or ascending, longer than the pedicels.—*Braya falcata*, Hochst. in Pl. Schimp. Abyss. *Arabis falcata*, Rich. Fl. Abyss. i. 17.

Nile Land. Abyssinia, on mountain summits, *Schimper!*

I follow Dr. Hooker in referring this plant to *Sisymbrium*; M. Fournier refers it with doubt.

4. **S. erysimoides,** *Desf.*; *DC. Syst. Veg.* ii. 482. A glabrous annual of 1–3 ft., simple or branched. Leaves lyrate-pinnatisect or, at least the upper, with the lobes confluent more or less and ovate-lanceolate, variously toothed. Racemes elongate, many-flowered. Pedicels of fruit about 1 line. Siliquas divergent, rigid, linear-subulate; valves 3-nerved; beak short.

Nile Land. Abyssinia, *Schimper.*

A wide-spread plant in the Mediterranean region. I have not seen Abyssinian specimens myself.

5. **S. Irio,** *Linn.*; *DC. Syst. Veg.* ii. 467 (var. *maximum*). An erect more or less branched herb with a smooth stem, glabrous or, in the African plant, sparsely pilose, at least below. Radical leaves oblanceolate, pinnatipartite, with spreading, rather acute segments or subruncinate. Cauline leaves narrow-lanceolate, the teeth or segments towards the base usually larger and deeper, usually shortly petiolate. Racemes elongate, leafless. Flowers small. Siliquas elongate, very narrow-linear, rather flaccid at first and subtorulose, spreading, 1½–2 in. or more in length, on pedicels of ¼–½ in. Seeds oblong, under a lens very minutely granulate.—*S. maximum*, Hochst., Fourn. Recherches Crucif. 72.

Nile Land. Abyssinia, *Schimper!*

Widely spread in Southern Europe and Western Asia, extending eastward to the Punjab, westward to the Canaries. Specimens from the latter islands closely resemble the Abyssinian plant. Is not *S. capense*, Thunb., referable to the same species?

6. **S. abyssinicum,** *Fourn. Recherches Crucif.* 71. Annual, with sparse, spreading, rigid hairs, attaining 2–3 ft. Leaves sessile, runcinate, glaucescent, thinly hairy. Pedicels ascending, about equalling the flowers, at length 6–7 lines. Siliqua torulose, rigid, compressed, 2 in. long, rostrate; valves 3-nerved.

Nile Land. Abyssinia, *Schimper.*

S. subulatum, Fourn., Recherches Crucif. 72. Much branched annual or biennial. Leaves undescribed. Fruiting racemes dense, elongate. Pedicels, in fruit, erecto-patent, 2 lines long, slightly thickened. Siliqua very narrow-linear, torulose, erecto-appressed, subulate, 1–1½ in. long, glabrous; valves 3-nerved; stigma sessile.

Nile Land. Abyssinia, *Schimper.*
Taken from M. Fournier's memoir.

Heliophila.—A large Cape genus, extends northwards to Natal, but I have seen no tropical specimens. It is characterized by the peculiar embryo, the cotyledons being twice folded transversely. The leaves are entire or variously cut, the siliquas long or short, continuous or the margins sinuate and moniliform. The flowers are white rose yellow or blue, with equal sepals.

9. BRASSICA, Linn.; Benth. et Hook. f. Gen. Pl. i. 84.

Sepals erect or spreading, the lateral often saccate at the base. Siliqua linear, elongate or narrow-linear-lanceolate, beaked, beak sometimes 1-seeded; valves costate, with or without lateral nervures; stigma truncate or 2-lobed. Seeds not margined or winged, globose, ellipsoidal or compressed, in one series. Radicle incumbent, more or less sheathed by the conduplicate or concave cotyledons.—Herbs sometimes woody below, glaucous glabrous or pilose-hispid. Radical leaves lyrate or pinnatipartite, rarely nearly entire. Flowers usually yellow.

A large and difficult genus, including several widely cultivated and very variable species, as Cabbage (*B. oleracea*) and Mustard, *B.* (*Sinapis*) *alba* and *nigra.*

The species are most numerous in the temperate zone of the Old World. Two or three grow at the Cape.

Cauline leaves narrowed below or petiolate. Siliquas ascending; valves with midrib and lateral nervures	1. *B. juncea.*
Cauline leaves narrow, petiolate. Siliquas short, appressed; valves without distinct lateral nervures	2. *B. nigra.*
Cauline leaves ovate-lanceolate, amplexicaul. Siliquas erect or ascending; valves with median and lateral nervures	5. *B. campestris.*
Radical leaves spreading, pinnatipartite with numerous toothed segments. Siliquas divergent with a 1-seeded beak	3. *B. Tournefortii.*
Glabrous or minutely setulose. Leaves entire or dentate, narrowed below, uppermost subamplexicaul. Siliquas spreading	4. *B. Schimperi?*

1. **B.** (*Sinapis*) **juncea** (*Linn.*), *DC. Syst. Veg.* ii. 612. An erect, usually more or less branched herb, attaining 2–3 ft. or more, glabrous or minutely setulose below. Lower leaves lyrate-pinnatifid or entire; cauline more or less lanceolate, entire or dentate. Siliquas usually 1–2 in., linear or narrow-linear-lanceolate with a straight, slightly compressed beak; valves with a distinct midrib and more or less obvious, often forking, lateral nerves. —*Sinapis abyssinica*, A. Br., and *Melanosinapis abyssinica*, in Herb. Hort. Petrop. *Brassica carinata*, A. Br., Rich. Fl. Abyss. i. 22. For extended synonymy, see Hook. f. et Thoms. in Journ. Linn. Soc. v. 170.

Nile Land. Abyssinia, cultivated, *Schimper!*
Lower Guinea. Angola, Golungo Alto, *Dr. Welwitsch!*
Mozamb. Distr. Near Murchison falls, on the Shire, *Dr. Meller!*
Extends from S. Europe to China. It is cultivated in the tropics for its oil. It is also used by the natives as a salad.

*2. **B.** (*Sinapis*) **nigra** (*Linn.*), *DC. Syst. Veg.* ii. 608. A branched

herb, glabrous or hispid below. Radical leaves lyrate, variously toothed, upper lanceolate or narrow-oblong, entire or sinuate. Siliquas ½ in. long or little more, on short, erect pedicels; beak straight, tapering; valves with a strong midrib.

Nile Land. Abyssinia, in cultivated ground, *Schimper!*
Widely spread in Southern Europe and Southern Asia.

3. **B. Tournefortii,** *Gouan; DC. Syst. Veg.* ii. 602. Erect, usually with spreading branches, shortly hispid below. Radical leaves narrowed to the base; segments patent or slightly recurved, oblong or obovate, toothed, obtuse or acute, sessile; cauline pinnatipartite or much reduced and linear or subulate. Siliquas divergent, straight, slightly torulose, often 1½–2 in., exclusive of the straight, 1-seeded beak of ¼–½ in.; valves with a more or less distinct midrib.

Nile Land. Abyssinia, *Schimper!*
Occurs in N. Africa and Western Asia.

4. **B. Schimperi?** *Boiss. in Ann. Sc. Nat. Ser.* 2. xvii. 86. An erect herb of 1–2 ft., glabrous or minutely retrorse-setulose or puberulous. Leaves lanceolate or oblanceolate, entire or sinuate-dentate, narrowed into a winged petiole, the uppermost nearly or quite sessile and subamplexicaul. Siliquas narrow-linear, 1–1½ in. long, patent, with a short beak; the valves with a distinct midrib and obscure lateral nervures. Pedicel short.—*Erucastrum arabicum*, F. et M. in Linnæa, xiii. Lit. Bl. 109 (*ex* Boiss.).

Nile Land. Abyssinia, *Schimper!*
Our specimens of this plant do not suffice to enable me to describe or determine it satisfactorily. It agrees well with specimens named *B. Schimperi*, Boiss., grown in the Royal Gardens, Kew, as well as with Boissier's description of the Arabian plant. It may possibly prove to be a small form of *Diplotaxis erucoides*.

*5. **B. campestris,** *Linn.; DC. Syst. Veg.* ii. 588. Erect glabrous or slightly hispid-pilose below, often glaucescent. Lower leaves lyrate-pinnatifid, upper ovate-lanceolate, sinuate-dentate, amplexicaul. Siliquas erect or ascending, on pedicels of ⅛–1 in.; valves with median and laterally anastomosing nerves; beak long, straight, half as long as the valves.—*B. amplexicaulis*, Hochst., Rich. Fl. Abyss. i. 23.

Nile Land. Abyssinia, *Schimper!*
Throughout Europe and greater part of Asia. The Turnip and Colza are cultivated varieties. Nearly allied is *B. oleracea*, the type of the cultivated Cabbage and its innumerable varieties. Cultivated in Abyssinia. It differs from *B. campestris* in its upper leaves, which are not auricled though sessile, and, usually, in the shorter beak of the fruit.

10. DIPLOTAXIS, DC.; Benth. et Hook. f. Gen. Pl. i. 84.

Sepals at length spreading. Siliquas linear, sometimes elongate, compressed, without or sometimes with (as in the following species) a short 1-seeded beak; valves with a slender median nerve; septum membranous. Seeds numerous, in two series, ellipsoidal or globose. Cotyledons conduplicate.—Herbs with the general aspect of *Brassica* and scarcely distinguishable excepting by the more distinctly biseriate seeds.

A genus of about 20 species, chiefly natives of Western Asia, Europe, and Northern Africa.

1. **D. erucoides,** *DC. Syst. Veg.* ii. 631. An erect, more or less branched herb of 1–2 ft. or more, glabrous or thinly hispidulous below. Lower leaves lyrate-pinnatifid or obovate-elliptical, toothed, and sessile or sometimes narrowed into a slender petiole; upper pinnatifid or nearly entire and toothed, usually sessile and more or less amplexicaul. Racemes erect, ebracteate. Flowers white or purplish, on rather slender pedicels. Siliquas 1 in. long or more, ascending, exceeding the pedicel; stigma (in fruit) broadly emarginate.

Nile Land. Abyssinia, various localities (*Richard*).
A species of Western Asia and the Mediterranean region.

11. ERUCA, Tourn.; Benth. et Hook. f. Gen. Pl. i. 84.

Sepals erect, nearly equal at the base. Siliquas oblong-linear, turgid, subterete, with a compressed, seedless, sword-like beak; valves convex with a distinct median nerve; septum membranous; stigma obtuse, undivided. Seeds numerous, biseriate or sub-biseriate, with free funicles; embryo with conduplicate cotyledons.—Erect branched annuals or biennials. Leaves lyrate or pinnatifid. Racemes ebracteate.

A small genus of Southern Europe, the Mediterranean, and Western Asia.

1. **E. sativa,** *Lam.; DC. Syst. Veg.* ii. 637. An erect, branched, glabrous, or more or less hispid herb of 2 ft. or more. Leaves lyrate-pinnatifid, or obovate to oblanceolate more or less pinnately toothed or sinuate; upper leaves petiolate, usually toothed. Flowers tolerably large, white or yellow. Siliquas erect, on short pedicels; valves about 1 in. long or less, exceeding or equalling the beak.—*Brassica Eruca,* Linn. Sp. Pl. 932.

Nile Land. Red Sea, *Dr. Nimmo!* Nile, near Assouan, *Bromfield!* Nubia (*Schweinf. et Asch. Enum.*).

The following genera allied to *Brassica, Diplotaxis,* and *Eruca,* probably occur in the desert south of the tropic of Cancer:—

Savignya, DC. Annuals with entire or pinnatifid leaves, rose or violet flowers and stipitate, compressed, elliptical or orbicular silicules.

Moricandia, DC. Shrubby glaucous herbs with entire amplexicaul or pinnatifid leaves, rather large rose or purple flowers and narrow linear siliquas.

Henophyton, Coss. et Dur. (*Oudneya?* Brown in Denh. and Clapp. App. 220). A shrubby much-branched herb with linear nearly entire leaves, purple flowers, narrow siliquas, and broadly-winged seeds.

Carrichtera, Adans. Erect annuals with pinnati- or bipinnatisect leaves, terminal or leaf-opposed racemes and short, turgid, few-seeded siliquas, with dilated leafy beaks as long as their valves.

12. SCHOUWIA, DC.; Benth. et Hook. f. Gen. Pl. i. 89.

Sepals suberect, lateral broader. Siliqua elliptical, emarginate or cordate at the base, much compressed laterally with a narrow septum, margins winged. Style persistent, elongate, subulate. Seeds indefinite. Cotyledons

conduplicate.—Glabrous branching herbs. Leaves entire. Cauline amplexicaul. Racemes narrow, elongate, ebracteate. Flowers purple.

A small genus of the desert regions bordering the Red Sea.

1. **S. arabica,** *DC. Syst. Veg.* ii. 644. Cauline leaves elliptic-oblong, broadly pointed or obtuse, sessile, with a deeply cordate or auricled amplexicaul base. Racemes ½–1 ft. or longer. Siliquas ½–¾ in. long, ⅓–½ in. broad, much exceeding the ascending pedicel.

Nile Land. Abyssinia (*Schweinf. et Asch. Enum.*).
Occurs in Egypt, Arabia, etc.

13. **CAPSELLA,** Mœnch; Benth. et Hook. f. Gen. Pl. i. 86.

Sepals equal, spreading. Siliqua (in the only tropical African species) obcordate-cuneate, laterally compressed; septum very narrow. Style short. Seeds numerous. Radicle incumbent.—Branched annual herbs. Radical leaves tufted entire or pinnatifid. Flowers small, white, racemose.

A small genus of which two or three species are very widely diffused weeds in temperate countries.

*1. **C. Bursa-pastoris,** *DC. Syst. Veg.* ii. 383. An erect often more or less hairy herb with spreading pinnatifid or sometimes entire radical leaves and elongate ebracteate racemes. Pedicels slender, patent.

Nile Land. Abyssinia, *Schimper!* Doubtless introduced.
A weed of cultivation. Common everywhere in extratropical countries.

14. **SUBULARIA,** Linn.; Benth. et Hook. f. Gen. Pl. i. 83.

Sepals spreading. Petals sessile. Siliqua shortly stipitate, elliptical oblong or subglobose, turgid, with convex ribbed valves; stigma sessile, entire. Seeds biseriate. Cotyledons recurved against the incumbent radicle.—Small aquatic glabrous annuals seldom exceeding 3 or 4 in. Leaves all radical, linear or subulate. Flowers racemose or corymbose, ebracteate, small, white.

The following is but the second species of the genus. *S. aquatica*, upon which the genus was based, is widely dispersed, occurring in the lakes of Northern Europe, Asia, and America.

1. **S. monticola,** *A. Braun; Schweinf. Fl. Æthiop.* 76. Leaves linear, obtuse. Raceme corymbose, 2–8-flowered, equalling the leaves.

Nile Land. Abyssinia, at a great elevation, *Schimper.*

15. **LEPIDIUM,** Linn.; Benth. et Hook. f. Gen. Pl. i. 87.

Sepals short, equal at the base or nearly so. 2 or 4 stamens sometimes deficient. Silicule varying from oblong to obcordate, rarely nearly globose, usually much compressed laterally, apex emarginate or nearly entire; valves keeled or winged; septum narrow, membranous. Seeds usually solitary in each cell. Radicle incumbent or accumbent. Cotyledons entire or tripartite.—Herbs sometimes shrubby, erect or diffuse, glabrous or pubescent. Leaves various. Flowers small, white, in ebracteate racemes.

A large genus diffused through the temperate and warmer regions both of the Old and New World. Ten species are enumerated in the 'Flora Capensis.'

Cotyledons 3-partite. Erect glabrous annual . . . . . 1. *L. sativum.*
Cotyledons entire.
Radicle incumbent. Puberulous erect or diffuse. Leaves linear or lanceolate . . . . . 2. *L. ruderale.*
Radicle accumbent. Glabrous, erect. Leaves oblanceolate, upper narrower . . . . . 3. *L. Armoracia.*

*1. **L. sativum,** *Linn.; DC. Syst. Veg.* ii. 533. An erect glabrous annual. Leaves entire or variously lobed or pinnatisect, often with linear segments; the lower petiolate, the upper linear or linear-oblong, sessile. Siliquas obovate- or broadly elliptico-rotundate, emarginate (occasionally with 3 valves), slightly but thickly winged above.

Nile Land. Abyssinia, *Schimper!* Kordofan, *Kotschy!*.
Common Cress. Everywhere cultivated, and often a weed of waste places.

2. **L. ruderale,** *Linn.; DC. Syst. Veg.* ii. 540. A more or less minutely puberulous annual or, in mountainous situations, tufted perennial. Stem branched erect or diffuse. Radical leaves more or less pinnatifid or incised; cauline linear or linear-lanceolate, incised dentate or entire. Racemes ebracteate. Pedicels rather exceeding or equalling the silicule, spreading. Silicules compressed ovate or rotundate-ovate, scarcely emarginate. Style very short. Radicle incumbent.—*L. intermedium,* Rich. Fl. Abyss. i. 21.

Nile Land. Abyssinia, *Dillon! Petit!*
Lower Guinea. Angola, *Dr. Welwitsch!*

Var. *alpigenum* (*L. alpigenum,* Rich. Fl. Abyss. i. 22). Biennial from a tufted stock. Radicle obliquely incumbent. Abyssinia, *Petit.*
This alpine variety much resembles some Tibetian forms of *L. ruderale.* Three at least of the Cape species of *Lepidium* maintained by Sonder in 'Flora Capensis' are reduced to *L. ruderale,* Linn., by Drs. Hooker and Thomson (Journ. Linn. Soc. v. 174).

3. **L. Armoracia,** *Fisch. et Mey. Index Sem.* 1842, 77. An erect, branched, glabrous herb, 1–2 ft. high. Radical leaves not seen; cauline rather coriaceous, oblanceolate, narrowed into the petiole, serrate or dentate-serrate above; the upper linear-lanceolate or quite entire. Racemes erect, ebracteate. Pedicels equalling the silicules, which are broadly elliptical-rotundate, scarcely emarginate. Style very short. Stamens 2 or 3, according to Fischer and Meyer, and Richard. Radicle accumbent.—*L. abyssinica,* Hochst. in Pl. Schimp. Abyss.; Rich. Fl. Abyss. i. 21.

Nile Land. Abyssinia, *Schimper!*
This may prove a form of *L. latifolium,* Linn.

16. THLASPI, Linn.; Benth. et Hook. f. Gen. Pl. i. 91.

Sepals small, erect. Silicules laterally compressed, oblong, obcordate or obovoid, emarginate or rarely acute; valves keeled or winged; septum narrow, membranous; stigma entire, obtuse, subsessile (in the following species). Seeds 2–8 in each cell, not margined; cotyledons accumbent.—Annual or perennial, usually glabrous or glaucous herbs. Radical leaves en-

tire or toothed, tufted; cauline oblong, auricled at the base. Flowers small in ebracteate racemes, white rose or pale purple.

A genus of temperate and Arctic countries, chiefly of the northern hemisphere.

Silicules compressed, obovate-rotundate, deeply notched . . . . . 1. *T. arvense.*
Silicules turgid, elliptical, scarcely notched . . . . . 2. *T. sp. nova ?*

1. **T. arvense,** *Linn.; DC. Syst. Veg.* ii. 375. An erect, simple or branched, glabrous herb. Radical leaves usually withered at time of flowering; cauline oblong, dentate or entire, obtuse or rather acute, amplexicaul. Silicules much compressed, obovate-rotundate, deeply notched, broadly winged, $\frac{1}{3}$–$\frac{3}{4}$ in. long and nearly as broad.

Nile Land. Abyssinia (*Schweinf. et Asch. Enum.*).
A weed of cultivation, widely spread in northern countries.

2. **T. sp. nova ?** A low, tufted, glabrous or nearly glabrous herb, 2 or 3 in. high or the stems elongate, 6 in. or more, very thinly pilose below. Leaves rather fleshy, glabrous, oblanceolate or oblong; the upper sessile, obtuse, auriculate and minutely toothed or entire. Racemes short, ebracteate, sometimes scarcely exceeding the leaves. Silicules turgid, oblong-ellipsoidal or obovate-ellipsoidal, rather obtuse, scarcely or not at all emarginate, equalling or exceeding the patent pedicels; valves convex, carinate.

Nile Land. Abyssinia, *Schimper!*

17. SENEBIERA, DC.; Benth. et Hook. f. Gen. Pl. i. 87.

Sepals short, spreading. Siliqua minute, 2-lobed, more or less laterally compressed; valves rough or crested, roundish, separating when ripe as two closed, indehiscent, 1-seeded cocci. Embryo curved, with narrow cotyledons or radicle incumbent.—Low diffuse herbs. Leaves pinnatifid or entire. Racemes usually short, leaf-opposed or apparently axillary.

A small, widely dispersed, weed-like genus.

Leaves entire or pinnatisect. Silicules nearly or quite entire (not emarginate) at the apex . . . . . 1. *S. nilotica.*
Leaves entire or minutely toothed. Silicules more or less deeply emarginate at the apex, distinctly didymous . . . . . 2. *S. integrifolia.*

1. **S. nilotica,** *DC. Syst. Veg.* ii. 527. An erect, diffuse or sometimes decumbent, branching, glabrous or nearly glabrous herb. Radical leaves linear-lanceolate or oblanceolate, pinnatisect, toothed or nearly entire. Cauline entire, linear or oblong or pinnately toothed. Racemes lateral and terminal, often very short, of numerous very small white flowers. Silicules more or less cordate-reniform; apex nearly or quite entire (not emarginate), more or less wrinkled, on slender short pedicels.—*Cotyliscus niloticus,* Desv. Journ. iii. 164, 175.

Nile Land. Banks of the Nile, various localities south of the tropic of Cancer, *Speke and Grant! Bromfield! Petherick!* etc.

2. **S. integrifolia,** *DC. Syst. Veg.* ii. 522. A glabrous, erect or decumbent, much-branched annual. Leaves linear acute or rather obtuse,

narrowed below, entire or minutely toothed. Flowers numerous, minute, in slender, terminal or leaf-opposed racemes. Silicules didymous, each valve subglobose, reticulate-wrinkled.—*S. linoides*, DC.; Harv. et Sond. Fl. Cap. i. 27.

Mozamb. Distr. Zambesi, *Peters (Klotzsch in Peters' Mossamb.)*; Europa Island, Mozamb. Channel, *Speke!*

This appears to be a widely-spread coast species, occurring about Capetown, in Madagascar, islands of the Chinese Sea, and N.E. Australia.

S. didyma, Pers., differing from *S. integrifolia* in having prostrate, more or less hairy stems and leaves all pinnatipartite, is a very common and widely dispersed weed, which may be expected as a waif upon the shores of tropical Africa. *S. Coronopus*, DC., with scarcely emarginate silicules, also prostrate, with pinnatifid leaves and deeply wrinkled fruits, is likely to occur in waste places.

18. **CRAMBE**, Linn.; Benth. et Hook. f. Gen. Pl. i. 98.

Sepals more or less spreading. Silicules separated by an articulation into two articles; the upper globose, 1-locular, 1-seeded, with a sessile stigma; the lower minute, seedless and pedicel-like. Seed globose, radicle incumbent on the conduplicate cotyledons.—Glabrous glaucous or pilose herbs, sometimes shrubby. Leaves lyrate or toothed. Racemes elongate, simple or panicled, ebracteate. Flowers white.

A genus of 10 to 20 species, confined chiefly to Europe, Western Asia, and the Atlantic Islands.

Stem and leaves more or less hispid-pilose	1. *C. hispanica.*
Stem and leaves glabrous, glaucescent	2. *C. sinuato-dentata.*

1. **C. hispanica,** *Linn.; DC. Syst. Veg.* ii. 655. An erect herb, more or less hispid-pilose below, attaining 1–4 ft. Lower leaves lyrate or reduced to the large rounded or cordate, terminal lobe, hispid. Cauline ovate or lanceolate, petiolate or narrowed below, unequally dentate. Racemes panicled; the lateral axillary ones usually considerably shorter than the primary axis.—*C. juncea*, Hochst. in Pl. Schimp. Abyss.

Nile Land. Abyssinia, *Schimper!*

A Mediterranean species.

2. **C. sinuato-dentata,** *Hochst. in Schimp. Pl. Abyss.* A slender, erect, glabrous, glaucescent herb. Cauline-leaves ovate-lanceolate or lanceolate, acute or subacute, toothed; the lower petiolate. Racemes simple or forked, elongate.

Nile Land. Abyssinia, *Schimper!*

This plant appears different from any other species which I have seen. It is probable that the racemes become panicled in more luxuriant specimens.

19. **ENARTHROCARPUS,** Labill.; Benth. et Hook. f. Gen. Pl. i. 99.

Sepals erect, equal at the base or the two lateral saccate. Siliquas elongate, curved, somewhat compressed, separated by an articulation into two indehiscent articles; the lower article shorter, with connate valves, 1–4-seeded, seeds pendulous; upper article 3–6-seeded, seeds erect. Radicle

incumbent and the cotyledons in the seeds of the lower article conduplicate or folded.—Erect, scabrid or more or less hispid annual herbs. Leaves, radical lyrate, cauline toothed. Racemes elongate, more or less bracteate. Flowers yellowish or purple.

A small genus of the eastern Mediterranean region.

Siliqua not winged, distinctly longitudinally striate . . . . . 1. *E. lyratus.*
Siliqua winged below, acuminate, transversely barred . . . . . 2. *E. pterocarpus.*

1. **E. lyratus,** *DC. Syst. Veg.* ii. 661. An erect or ascending, more or less branched herb, more or less pilose-hirsute below. Radical leaves lyrate-pinnatifid, lobes spreading, toothed; cauline lyrately- or pinnately-toothed, more or less hirsute or sparsely pilose. Racemes terminal, elongate, bracteate. Bracts oblong or oblanceolate, toothed or the lower lyrate. Pedicels erect, 1–2 lines. Flowers "yellowish, streaked with purple." Siliquas erect or curved, more or less nodulose, longitudinally striate, glabrate scabrid or pilose, obtusely acuminate with the persistent style.

Nile Land. Dongola, *Ehrenberg.*
An Egyptian plant.

2. **E. pterocarpus,** *DC. Syst. Veg.* ii. 661. Much branched from the base, hispid-scabrid below. Leaves petiolate, lyrate-pinnatifid with dentate segments; upper oblong, dentate or serrate. Pedicels erect, usually bracteate. Siliquas erect, linear-acuminate arcuate, with winged setulose-scabrid margins; valves transversely constricted.—Deless. Ic. Sel. ii. 93.

Nile Land. Nubia (*Schweinf. et Asch. Enum.*).
Also in Egypt.

20. ZILLA, Forsk.; Benth. et Hook. f. Gen. Pl. i. 98.

Sepals erect. Petals clawed. Silicule bony or crustaceous, ovoid or pyramidal, beaked, winged or unappendaged. Seeds solitary. Cotyledons conduplicate.—Shrubby, much-branched, often spinescent herbs. Leaves oblong or linear, entire or toothed, rather fleshy. Flowers white or violet, solitary or racemose.

A small desert genus of northern Africa and western Asia.

1. **Z. myagroides,** *Forsk.; DC. Syst. Veg.* ii. 646. Glaucous more or less. Branches rigid, terete, intricate, usually terminating in acute divaricate spines. Flowers scattered on the extremities or subracemose. Silicule shortly pedicellate, ovoid or ovoid-globose with a conical-subulate beak, nearly smooth or reticulate-rugose.

Var. *microcarpa* (*Z. microcarpa*, Vis.; Schweinf. Pl. Nilot. t. 7).
Nile Land. Nubia (*Schweinf. et Asch. Enum.*).
A desert plant of North Africa and Arabia.

21. DIPTERYGIUM, Dene.; Benth. et Hook. f. Gen. Pl. i. 95.

Sepals short. Silicules ellipsoidal, slightly compressed laterally, indehiscent, girt with a membranous wing, 1-celled, 1-seeded. Seed not margined; cotyledons concave; radicle incumbent.—A shrubby herb, with numerous,

straight, rigid, divaricate branches, terminating in narrow, small and rather distant-flowered, bracteolate racemes. Leaves very small, oblong or ovate, entire, on very short petioles.

1. **D. glaucum,** *Decaisne in Ann. Sc. Nat. Ser.* 2. iv. 67. Glabrous or granular-scabrid. Leaves 2–10 lines long, glabrous or rough with glands.—*Pteroloma arabicum,* Hochst. et Steud.

Nile Land. Nubia, *Kotschy! Bromfield! Schweinfurth!*
The only species of the genus, occurring also in Arabia and N.W. India.

22. RAPHANUS, Linn.; Benth. et Hook. f. Gen. Pl. i. 101.

Sepals erect; the lateral ones saccate at the base. Petals veiny. Siliqua short or elongate, terete, continuous or constricted, continuous within or filled with cellular or corky tissue, in which the seeds are singly immersed; style slender; stigma emarginate or scarcely divided. Seeds globose or more or less compressed; radicle incumbent, cotyledons conduplicate.—Annual or biennial, branched, hispid or glabrous herbs. Radical leaves lyrate. Flowers tolerably large, white or buff, veined with purple.

A small genus of Europe and temperate Asia, of which the following species (the Radish) is widely cultivated, and often occurs as a stray weed in waste places.

*1. **R. sativus,** *DC. Syst. Veg.* ii. 663. Flowers variable in colour, white yellow or lilac. Siliqua 1–2 in. long, 4–5 lines in diam., continuous, terminating in a tapering beak. Seeds immersed in light, cavernous, cellular tissue.

Nile Land. Abyssinia, cultivated (*Richard*).

ORDER IX. CAPPARIDACEÆ (by Professor Oliver).

Flowers regular or the sepals or petals sometimes unequal, rarely polygamous. Sepals 4, rarely 3 or 5, free or connate below, valvate, imbricate or open in æstivation. Petals 4 or 0, rarely 3 or indefinite, sessile or clawed. Torus sometimes with a linear, oblong or ligulate-tubular appendix. Stamens definite or indefinite, inserted upon the torus, which is sometimes shortly columnar, or the filaments adherent more or less to the gynophore; filaments equal or unequal, usually filiform; anthers usually oblong or linear, 2-celled, dehiscing longitudinally (some of them effete in certain species). Ovary sessile or supported upon a gynophore of various length, usually ovoid, globose or oblong, 1-celled or divided by spurious dissepiments into 2 or more cells. Ovules indefinite, sometimes few, parietal. Fruit a siliquiform capsule, or baccate, oblong, globose or elongate, cylindrical or torulose, many- or few-, rarely 1-seeded. Seeds usually more or less reniform, or somewhat angular in baccate fruits, with a crustaceous or coriaceous testa; albumen thin or 0. Embryo usually curved; cotyledons plane, folded or convolute; radicle often conical and incumbent.—Herbs shrubs or trees, often scandent, glabrous pubescent tomentose glandular or scabrid. Leaves alternate, rarely fasciculate, simple or 3 7-foliolate, leaflets usually entire; stipules,

when present, minute or represented by short spines. Flowers axillary or terminal, solitary racemose corymbose fascicled or umbellate, often showy.

A large family of tropical and subtropical countries of both hemispheres. Of the eleven genera represented in tropical Africa, four are common to Asia and America, two to Asia and Africa only, while five are peculiar to Africa and the Mascarene Islands.

Fruit a siliquiform (linear, oval or ellipsoidal) capsule with 2 valves separating from a persistent replum. Sect. *Cleomeæ*.
- Stamens inserted upon the torus . . . . . 1. CLEOME.
- Stamens inserted upon the gynophore . . . . . 2. GYNANDROPSIS.

Fruit various, usually indehiscent, baccate (in few species at length dehiscent, without a septum). Sect. *Capparea*.
- Sepals coherent; the calyx transversely ruptured on expansion. Petals 0 . . . . . 3. THYLACHIUM.
- Sepals connate below in a tube; lobes free.
  - Calyx-lobes 4, valvate; tube infundibuliform or tubular. Petals 4 or 0 . . . . . 4. MÆRUA.
  - Calyx-lobes 3 (rarely 4–2), valvate; tube short. Petals 0. Ovary fusiform . . . . . 5. COURBONIA.
- Sepals free (or very shortly connate below), open imbricate or valvate, in one or two series.
  - Torus with a tubular or ligulate appendix.
    - Sepals in two series; the outer pair enclosing the inner in bud. Stamens 4–5. Leaves simple . . . . . 6. CADABA.
  - Torus with a linear appendix, terminating in minute knobs.
    - Sepals open in æstivation. Stamens 5–7. Leaves 3-foliolate . . . . . 7. EUADENIA.
  - Torus without an appendix.
    - Sepals 4, valvate, equal. Petals 0. Stamens 6–20. Leaves simple . . . . . 8. BOSCIA.
    - Sepals 4, imbricate or valvate, in one or two series, equal or unequal (apparently 2 sepals in sect. *Petersia*). Petals 4. Leaves simple. Branches often spinose . . . . . 9. CAPPARIS.
    - Sepals 4, open in æstivation. Petals 4, with a distinct claw. Trifoliolate, unarmed . . . . . 10. CRATÆVA.
    - Sepals 4, valvate. Petals 4–∞. Leaves 3–5-foliolate or simple . . . . . 11. RITCHIEA.

1. CLEOME, Linn.; Benth. et Hook. f. Gen. Pl. i. 105.

(Polanisia, *Rafn.*; *Benth. et Hook. f. l. c.* 106.)

Sepals 4, ovate, lanceolate, linear or subulate, free or coherent below, deciduous or persistent. Petals 4, equal or unequal, clawed or sessile, entire or nearly so, imbricate convolute or open in æstivation. Stamens 4–20, all or two or more anther-bearing, often unequal and more or less declinate, inserted upon the torus, free or very shortly coherent at the base. Ovary sessile or stipitate, 1-celled; ovules indefinite on two parietal placentas; style various or 0. Capsule linear, oval or ellipsoidal, sessile or stipitate, 1-celled, with membranous or rather coriaceous valves separating from a persistent replum. Seeds indefinite, reniform or globose-reniform, glabrous or pilose, smooth or variously rugose; cotyledons incurved or circinate.—Herbs or shrubs, rarely subarborescent, glabrous, glandular, scabrous or aculeolate. Leaves simple or 3–7-foliolate; leaflets entire or serrulate. Flowers racemose or solitary and axillary, white yellow or purplish.—*Dianthera*, Kl. in Peters' Mossamb.

Bot. 160, *Chilocalyx*, Kl. l. c. 154. *Decastemon*, Kl. l. c. 157. *Symphyostemon*, Kl. l. c. 159. *Anomalostemon*, Kl. l. c. 162.

A large genus of tropical and subtropical countries both of the Old and New World. Several of the species are common to tropical Africa and to India, and one or two of the following are closely allied to, if not identical with, S. American species.

It is probable that some of the Arabian, N. African, and Cape species, not referred to here, may penetrate within the tropics.

Leaves simple.

Stamens 4–6.

Erect ½–2 ft. Leaves linear-lanceolate to oblong, pubescent. Stamens 6. Capsule 1–4 in. Seeds transversely rugose . . . . 1. *C. monophylla.*

Low, branching, scabrous or hispid herb. Leaves ovate to orbicular or cordate. Stamens 6. Capsule ¾–1½ in. Seeds minutely pitted 2. *C. papillosa.*

Branches 1–2 ft. Glandular setulose or scabrous. Leaves lanceolate to ovate-lanceolate. Stamens 6. Capsule linear-oval, 1½–2½ in., pendulous. Seeds pilose . . . . . 3. *C. trinervia.*

Low, branching, hispid herb. Leaves broadly ovate-rotundate. Stamens 4. Capsule usually under ½ in. Seeds minutely granular . 4. *C. droserifolia.*

Stamens 10–14.

Ascending or diffuse, ½–1½ ft. Leaves oblong- to rotundate-ovate, shortly glandular-hirsute. Style equalling or exceeding the oval-oblong ovary. Capsule 2–4 lines long . . . . . 5. *C. chrysantha.*

Leaves 3–5–7-*foliolate.*

† Anther-bearing stamens about 6 or fewer.

* *Capsule sessile or subsessile.*

Scabrous. Trifoliolate below. Capsules linear-oval, pendulous. Seeds cottony-pilose . . . . . 6. *C. arabica.*

Diffuse. Leaflets 3–5–1, oblanceolate or oblong. Capsule oval or elliptical, 2–4 lines long. Style long. Seeds nearly smooth . 7. *C. brachycarpa.*

Erect, glabrous. Trifoliolate; leaflets filiform. Capsule linear, 1–2 in. long. . . . . 8. *C. tenella.*

* * *Capsule distinctly stipitate.*

Glabrous or with sessile glands above. Leaflets 3–6, linear or linear-lanceolate. Capsule linear, 4 in. long. Seeds shortly pilose . . . . . 9. *C. paradoxa.*

Trifoliolate. Leaflets rhombo-elliptical to lanceolate, thinly setulose-pilose at first. Capsule linear, 1½–2½ in. . . . . 10. *C. ciliata.*

Puberulous, often minutely aculeate. Leaflets 5, lanceolate or oblanceolate acuminate. Racemes bracteate. Stamens much exserted. Capsule linear-oval, about 2 in. long, glabrous on gynophore of 1 in. . . . . 11. *C. spinosa ?*

Glandular-setulose. Leaflets 3–5, linear, setulose or glabrate. Racemes closely bracteate. Stamens 6. Capsule linear, 1 in. Seeds transversely rugose . . . . . 12. *C. Iberidella.*

Erect, glabrous, glaucescent. Leaflets 5–7, very narrow-linear. Perfect stamens 4. Capsule linear, 3 in. Seeds pitted . . . 13. *C. didyma.*

Erect, glabrous or thinly glandular, glaucescent. Leaflets 3 7, very narrow, linear. Perfect stamens 2. Capsule narrow-linear, 2–3 in. Seeds pitted, shortly hairy . . . . . 14. *C. diandra.*

† Anther-bearing stamens 8 to 20.

* *Capsule sessile.*

Glandular-pubescent. Leaflets 5 or 3, obovate to lanceolate. Capsule glandular-pubescent . . . . . 15. *C. viscosa.*

* *Capsule distinctly stipitate.*

Glandular-pilose. Leaflets 5 or 3, obovate. Capsule striate. Seeds pitted, glabrous . . . . . 16. *C. foliosa.*

Strigose. Leaflets 5 or 3, obovate. Stamens 10–14. Capsule strigillose or glabrous; valves with about 3 nervures. Seeds transversely rugulose . . . . . 17. *C. strigosa.*

Glabrous. Leaflets 3, lanceolate or linear-lanceolate, acute or acuminate. Bracts minute, subulate. Pedicels very short. Sepals linear-subulate. Capsule-valves 3-nerved, glabrous . . . . 18. *C. chilocalyx.*

Pubescent or puberulous. Leaflets 7–5, linear-lanceolate or linear, rather obtuse. Bracts 5–3–1-foliolate. Sepals linear. Capsule setulose-pubescent . . . . . 19. *C. hirta.*

Pubescent or strigillose. Leaflets 3–5, oblanceolate or oval acute. Bracts 1–3-foliolate. Capsule hairy or glabrate . . . . . 20. *C. Borórensis.*

1. **C. monophylla,** *Linn.; DC. Prod.* i. 239. An erect, branching, pubescent herb, usually from 6 in. to 2 ft. Leaves oblong- to linear-lanceolate, acute or rather obtuse, entire, base obtuse, rounded or slightly cordate, usually 1–3 in. long, 2–10 lines broad; petiole varying from 2 lines to 1 in. or more. Racemes bracteate; bracts linear, lanceolate or ovate, sessile or subsessile. Flowers pale rose or white and red, on slender ascending pedicels. Sepals narrow-linear. Stamens 6. Capsule narrow-linear, 1–4 in. long, striate, shortly pilose-pubescent, tipped with the short style; gynophore very short or 0. Seeds transversely rugose.—*C. cordata,* Burch., DC. Prod. i. 239. *C. subcordata,* Steud. in Schimp. Pl. Abyss.

Upper Guinea. Senegambia, *Perrottet!* Niger, *Barter!*
North Central, *E. Vogel!*
Nile Land. Abyssinia, *Schimper!* and others; Kordofan, *Cienkowski;* 5–6° south lat., *Speke and Grant!*
Lower Guinea. Angola, weed of cultivation, *Dr. Welwitsch!*
Mozamb. Distr. Zambesi, *Dr. Kirk!*
Also at the Cape.

2. **C. papillosa,** *Steud. Nom. Bot.; Anderson in Journ. Linn. Soc.* v. *Suppl.* i. 3. A low scabrous or hispid herb of 4–12 in., usually with several erect or ascending slender stems more or less leafy below. Radical leaves ovate to orbicular, shortly hispid-scabrous, entire, ⅛–1 in. diam., petiolate; cauline leaves often cordate-based, shortly petiolate or sessile. Flowers small, lax, on capillary ascending or patent pedicels. Bracts small or obsolete. Sepals linear-lanceolate. Stamens 6. Capsule narrow-linear, patent or slightly decurved, sessile, glabrous or nearly so, ¾–1½ in. long. Style very short. Seeds reniform, dark, minutely pitted-rugulose.—*C. Ehrenbergiana,* Schweinfurth, Fl. Æthiop. 68. *C. Radula,* Fenzl in Flora 1844, 312.

Nile Land. Kordofan, *Kotschy!* Abyssinia, *Schimper!* Nubia, *Ehrenberg.*
Extends eastward through Arabia to N.W. India.

*3. **C. trinervia,** *Fresen. in Mus. Senck.* i. 177. *t.* xi. Branches 1–2 ft., glandular-setulose. Leaves lanceolate ovate-lanceolate or oval, rather acute, more or less densely glandular, 3-nerved below, 1 in. long or less in our specimens, on petioles of ½ in. or shorter. Racemes at length elongate, Bracts oval or linear, shorter than the pedicels or obsolete. Sepals lanceolate to ovate, 3–4 times shorter than the oval clawed petals. Stamens 6. Fruit linear-oval, sessile or subsessile, 1½ 2½ in. long, about 3 lines broad, pendu-

lous, on patent pedicels; valves scabrid. Style very short or stigma subsessile. Seeds pilose.

I have only seen specimens from Arabia and Upper Egypt, but it is likely to occur south of the tropic. This plant has much of the aspect of *C. arabica*.

4. **C. droserifolia,** *Delile; DC. Prod.* i. 239. A low much-branched and shrubby glandular-hispid herb of 3 to 10 in. Leaves broadly ovate-rotundate, obtuse, with a more or less truncate triplinerved base, setose, hispid or scabrous, ¼–½ in. diam., equalling or usually shorter than their petioles. Flowers axillary, pedicellate. Sepals glandular-setose. Petals somewhat lanceolate with a thickened scale-like appendage at the base. Stamens 4. Ovary oblong or oval, shortly and densely glandular, sessile or subsessile, with a very long slender style. Fruit oval, 4–5 lines long, with setose-hispid concave valves. Seeds reniform-globose, rather compressed, minutely granular.—*C. Roridula*, R. Br. in Salt, Abyss. App. 65.

Nile Land. Nubia, Abyssinia (*Schweinf. et Asch. Enum.*); Abyssinia, *Salt!*
Found also in Egypt and Arabia.

5. **C. chrysantha,** *Decaisne in Ann. Sc. Nat. Ser.* 2. iii. 274. An ascending or diffuse herb 6–18 in. high or sometimes flowering as seedlings of 1–2 in. Stem leafy, simple or branched, pilose or hirsute with spreading simple or glandular hairs. Leaves from rotundate- to oblong-ovate, obtuse or scarcely acute, entire, shortly glandular-hirsute, 3–7 lines long, on more or less spreading petioles shorter than or exceeding the blade. Flowers in the axils of the upper leaves, which usually equal or exceed the pedicels. Stamens 10–14, of which a few are often smaller or effete. Style slender, equalling or exceeding the oblong-oval, closely glandular-pilose, sessile or subsessile ovary; stigma capitate. Capsule oval-oblong, 2–4 lines long. Seeds globose-reniform, minutely pitted-rugulose.

Nile Land. Deserts of Nubia, *Petherick! Bromfield! Kotschy!*
Also an Arabian plant.

6. **C. arabica,** *Linn.; DC. Prod.* i. 240. Erect, simple or branched, scabrous. Leaves 3-phyllous or the upper simple; leaflets usually oblanceolate or linear, rather obtuse, glabrous or scabrous. Racemes leafy. Stamens 6 (or 5). Ovary sessile or subsessile. Capsule linear-oval, scabrous, often pendulous. Seeds cottony-pilose.—*C. Siliquaria*, R. Br. in Salt, App. 65.

Nile Land. Abyssinia, Nubia (*Schweinf. et Asch. Enum.*).
Perhaps also Soudan (R. Brown in Denham and Clapp. App. 17). Widely spread in North Africa.

7. **C. brachycarpa,** *Vahl; DC. Prod.* i. 240. A low diffuse herb 4–8 in. high, more or less glandular-pubescent or scabrid-setulose, sometimes glabrescent. Leaves 3–5–1-foliolate, petiolate or the upper sessile; leaflets oblanceolate or oblong, acute or obtuse and mucronulate. Flowers pedicellate in the axils of the upper leaves or distinctly racemose with simple or 3-foliolate bracts. Pedicels slender, much exceeding or equalling the bracts. Sepals lanceolate. Stamens 6, of which one is sometimes imperfect. Ovary minutely glandular or glabrous, sessile. Style slender. Capsule oval or elliptical, usually glandular, 2–4 lines long, longer or shorter than the style;

stigma capitate or subcapitate. Seeds nearly smooth.—*C. Vahliana*, Fres. in Mus. Senck. ii. 110. *C. diversifolia*, Hochst. et Steud. in Schimp. Pl. Arab. *C. parviflora*, R. Br. in Salt, Abyss. 65.

Nile Land. Abyssinia, *Salt! Roth!* Kordofan, *Cienkowski;* Nubia, *Schweinfurth!* Grows also in N.W. India and Arabia. Very common at Aden.

8. **C. tenella,** *Linn. f.; DC. Prod.* i. 240. An erect, perfectly glabrous, glaucescent herb, 1–2 ft. high, with numerous slender forking branches. Leaves 3-foliolate, on very slender ascending petioles or the upper simple; leaflets linear, filiform, scarcely thicker than the petiole. Flowers small, on hair-like pedicels in the axils of the upper leaves. Sepals ovate or oblong-lanceolate, much shorter than the oval, clawed, purple-streaked petals. Stamens 6. Fruit narrow-linear, glabrous, 1–2 in. long, sessile or subsessile, striate. Style very short. Seeds globose-reniform, minutely rugulose-pitted. —*Cleome angustifolia*, Rich. in Fl. Seneg. (non Forsk.) 21.

Upper Guinea. Senegambia, *Perrottet, Heudelot!*
Nile Land. Senaar, *Kotschy!*
Extends to India.

9. **C. paradoxa,** *Br. in Salt, Abyss. App.* 65. An erect, somewhat shrubby plant of 2–3 ft., the branches simple or forking, leafy, glabrous or with dark sessile glands above. Leaves 3–6-foliolate; leaflets linear or linear-lanceolate, glabrous, glaucescent. Racemes terminal. Flowers pedicellate, rather large, yellow or rose, closely corymbose at first. Bracts linear or obsolete. Sepals ovate or ovate-lanceolate, often glandular. Petals unequal. Stamens 6, 2 usually much longer. Fruits widely spreading or pendulous, linear, tapering to each end, about 4 in. long, 2–3 lines broad; gynophore $\frac{1}{2}$ $\frac{3}{4}$ in. Persistent style short, tapering, many times shorter than the glabrous striate valves. Seeds subglobose, shortly pilose. Cotyledons circinate.—*C. venusta*, Fenzl in Flora 1844, 312 (name only). *Dianthera grandiflora*, Kl. in Peters' Mossamb. Bot. 161 (Schweinfurth, Fl. Æthiop. 71, 305).

Nile Land. Abyssinia, *Salt! Roth!* Kordofan, *Kotschy!*
Common at Aden.

10. **C. ciliata,** *Schum. et Thonn. Guin. Pl.* 294. An erect, sparsely setulose-pilose or subglabrous herb, simple or branched below, from a few inches to 2 or 3 ft. and suffrutescent. Leaves 3-foliolate or sometimes 5-foliolate, rhomboid-elliptical to lanceolate, usually acute at each end, minutely or obsolete ly ciliolate and very thinly pilose-setulose at first or glabrous, petiolate or the upper sessile. Sepals narrowly linear-lanceolate. Stamens 6. Siliqua linear, 1 $2\frac{1}{2}$ in., narrowed to each end, stipitate, glabrous or glandular-setulose with longitudinal anastomosing nerves; gynophore $\frac{1}{4}$ $\frac{1}{2}$ in. Style short, slender. Seeds transversely rugose.—*C. guineensis*, Hook. f. Fl. Nigrit. 218.

Upper Guinea. Senegambia, Sierra Leone, Cape Coast, Niger, *T. Vogel* and *Barter!* Camaroons river, *Mann!* Prince's Island, *Mann.*
Lower Guinea. Congo, *Smith! Burton!* various provinces of Angola, both in dry and moist pastures, *Dr. Welwitsch!*

11. **C. spinosa,** *Linn.? DC. Prod.* i. 239. Shrubby, the extremities

glandular-puberulous with or without scattered short aculei often present at the base of the petioles. Leaves 5-foliolate; leaflets lanceolate or oblanceolate, shortly petiolulate, acuminate, at first hispidulo-pubescent or setulose, especially on the midrib and veins. Racemes with numerous elliptical or oval acute sessile or shortly petiolate bracts. Flowers pink. Sepals linear-lanceolate. Stamens about 6, much exserted (inserted within a fleshy disk in one specimen). Capsule linear-oval, on patent pedicels 1½–2½ in. long, 3–4 lines broad, on long stipes of 1–1¼ in., glabrous, finely striate when dry; stigma capitate sessile or subsessile. Seeds globose-reniform, smooth or nearly so.

Upper Guinea. Old Calabar, *W. C. Thomson!*

(? Congo, *Smith*, a very bad specimen.)

C. spinosa is an American species. I have had imperfect material for determination and the African plant may prove a distinct species, though certainly nearly allied to some New World forms of confused synonymy. It is near to *C. micrantha*, Desv.

12. **C. Iberidella,** *Welw. mss.* An erect, minutely and thinly glandular-setulose herb, branched below, ¾–1½ ft. Leaves 3–5-foliolate; leaflets linear, scarcely acute or mucronulate, with the petioles, which they usually exceed, sparsely setulose or glabrescent. Erect flowering branches with very numerous or almost crowded, minute, sessile, 3-foliolate or simple bracts. Pedicels patent, capillary, ⅓–½ in., glandular-puberulent. Sepals lanceolate or linear-lanceolate. Petals nearly equal, linear, narrowed below. Stamens 6, all fertile. Capsule linear, decurved, about 1 in. long, finely striate, with a slender, subulate, persistent style, and stipes of about 2 lines. Seeds transversely tuberculate-rugose.

Lower Guinea. Angola; Pungo-Andongo, abundant in sandy and stony places by the Cuanza, *Dr. Welwitsch!*

13. **C. didynama,** *Hochst. in Schimp. Pl. Abyss.* An erect, branched, perfectly glabrous, glaucescent herb, probably attaining 2 or 3 ft. Leaves 5–7-foliolate, petiolate; leaflets very narrow-linear. Racemes lax; bracts very narrow-linear, 3-foliolate or simple. Pedicels capillary, at length about 1 in. long. Sepals lanceolate or oblong-lanceolate. Anther-bearing stamens 4; staminodia 4. Capsule narrow-linear, spreading or pendulous, about 3 in. long, shortly stipitate, glabrous, with longitudinal, anastomosing veins, tapering into the slender style. Seeds globose-reniform, minutely pitted, nearly or quite glabrous.—*Dianthera abyssinica*, Schweinf. Fl. Æthiop. 70 (ex. descr.).

Nile Land. Abyssinia, *Schimper!*

Nearly allied to a Cape *Cleome*, the *Tetratelcia maculata* of Sonder, Fl. Capensis, i. 58.

14. **C. diandra,** *Burch. Trav.* i. 548. An erect, simple or branched, glabrous or thinly glandular or minutely aculeolate, glaucescent or glaucous herb, sometimes woody below. Leaves 5–7–3-foliolate, with very narrow linear leaflets. Racemes lax. Bracts 3–1-foliolate. Sepals linear-lanceolate. Two longer petals obovate or oblanceolate, clawed. Anther-bearing stamens 2; staminodia 6 12. Ovary stipitate. Stigma capitate. Capsule narrow-linear, patent or pendulous, glabrous, rather finely striate, 2–3 in. long, on stipes of about ½ in. Seeds pitted, shortly hairy.—*Polanisia dianthera*, DC. Prod. i. 242. *Dianthera Burchelliana* and *D. Petersiana*, Kl. in Peters' Mossamb. Bot. 160.

Nile Land. Kordofan, *Cienkowski*; Abyssinia (*Schweinf. et Asch. Enum.*).
Lower Guinea. Sandy places, Mossamedes, Angola, *Dr. Welwitsch!*
Mozamb. Distr. Zambesi, *Peters.*
A species included in the Cape Flora.
Var. β. *pteropoda* (Welw.), petioles dilated; capsules 2–3 lines broad.—Coast near Mossamedes, *Dr. Welwitsch!*
This variety looks distinct, but is, I believe, merely a maritime condition of the type.

15. **C. viscosa,** *Linn. Sp. Pl.* 938. An erect, glandular-pubescent herb, from a few inches to 1 or 2 ft. Leaves usually 5–3-foliolate; leaflets elliptical, varying from obovate to lanceolate, narrowed to the base or shortly petiolulate, obtuse acute or acuminate, more or less pubescent or glabrate. Flowers yellow, racemose in the axils of the upper leaves. Sepals linear. Petals oblanceolate, narrowed into the claw, often 2–3 times longer than the sepals. Stamens about 12 (8–20). Capsule narrow-linear, glandular-pubescent, sessile, 2–4 in. long or sometimes shorter. Style slender, variable in length. Seeds transversely rugose.—*Polanisia viscosa*, DC. Prod. i. 242. *P. orthocarpa*, Hochst.; Webb, Frag. Fl. Æthiop. 23. *P. viscosa*, β. *icosandra*, Herb. Schweinf.

North Central. *E. Vogel!*
Nile Land. Kordofan and Sennar, *Kotschy!* Gallabat, *Schweinfurth!*
No doubt more frequent in tropical Africa than the few recorded stations indicate. Very common in India, extending to China and Australia.

16. **C. foliosa,** *Hook.f. Fl. Nigrit.* 219. Branches 1 ft. or more in length, erect, leafy, glandular-pilose or pubescent, or glabrate from a woody, sometimes prostrate stem. Lower leaves usually 5-foliolate, upper or all 3-foliolate; leaflets obovate, elliptical or obovate-rotundate, obtuse or minutely mucronate, very shortly petiolulate or sessile, minutely glandular-pubescent, ½–1½ in. long, ¼–½ in. broad. Flowers pedicellate in the axils of the upper leaves or in bracteate racemes; bracts usually 3-foliolate, ½–1 in. diam. when expanded. Stamens (6 according to Dr. Hooker) inserted on the torus. Fruit narrow-linear, 2–2½ in. long, glandular-puberulous, striate, stipitate. Style short. Seeds pitted, glabrous.—*Polanisia Maximiliana*, Wawra and Peyritsch, Sert. Beng. 26 (*ex descr.*).

Lower Guinea. Elephant Bay, W. Tropical Africa (south of equator), *Curror!* Benguela, *Wawra.*
Closely resembling *C. viscosa*, as observed by Dr. Hooker, but differing in its stipitate ovary.

17. **C. strigosa,** *Oliv.* An erect, strigose herb. Leaves 5–3-foliolate; leaflets obovate, narrowed to the base, apex obtuse or rounded, 1 in. long or less in our specimens, appressed-strigose. Flowers rather large, rose-coloured, pedicellate in the axils of 3-foliolate or simple bracts. Stamens 10–13. Capsule narrow-linear, minutely strigillose or glabrous, 1–2½ in. long; valves with about 3 strong nervures; stipes from 2–8 lines. Style short. Seeds reniform-globose, transversely rugulose.—*Polanisia strigosa*, Bojer in Ann. Sc. Nat. Ser. 2. xx. 56. *Decastemon zanzibaricus*, Kl. in Peters' Mossamb. Bot. 158. *Symphyostemon strictus*, Kl. l. c. 159.

Mozamb. Distr. Island of Zanzibar, *Bojer!* Mozambique, *Dr. Peters!*
Allied to *C. viscosa*, from which it differs in its shortly strigose stem and leaves, larger red flowers, and stipitate fruit.

I do not perceive any specific difference between authentic specimens named by Klotzsch as above.

18. **C. chilocalyx,** *Oliv.* An erect, slender, glabrous annual, 1–2 ft. high. Leaves 3-foliolate, chiefly from the lower part of the stem, on rather long, slender petioles, usually exceeding the lanceolate or linear-lanceolate, acute or acuminate, minutely setose-serrulate, subsessile leaflets. Racemes at length elongate, lax. Bracts minute, subulate. Pedicels very short, patent, 1–3 lines long. Sepals linear-subulate, unequal. Petals linear-spathulate, about ½ in. long in our specimens. Stamens 10–12. Capsules spreading, narrow-linear, elongate, 3–4 in. long, glabrous, longitudinally 3–4-nerved, on a gynophore of ½–¾ in. Seeds globose, reniform, transversely rugose, with intermediate longitudinal striæ.—*Chilocalyx macrophyllus*, Kl. in Peters' Mossamb. Bot. 155.

Var. β. *tenuifolius* (*C. tenuifolius*, Kl. l. c.). Leaflets linear.
Mozamb. Distr. Zambesi and Shire, *Drs. Kirk and Meller! Peters!*

19. **C. hirta,** *Oliv.* An erect, pilose-pubescent herb, 1–2 ft. high. Leaves on rather long petioles, 7–5-foliolate, minutely hairy, scaberulous or glabrescent; leaflets narrow linear-lanceolate or linear, usually rather obtuse or broadly pointed. Racemes more or less leafy, with simple or 5–3-foliolate bracts. Sepals linear, acute, glandular. Petals nearly equal, purple and white or blotched with yellow. Stamens 10–12, rarely fewer, the longer at length much exserted. Capsule narrow-linear, sparsely setulose-pubescent or glabrate, striate, about 2–3½ in. long, on a short gynophore. Seeds globose-reniform, transversely rugose.—*Decastemon hirtus*, Kl. in Peters' Mossamb. Bot. 157.

Lower Guinea. Various provinces of Angola, in sandy and waste ground, *Dr. Welwitsch!*
South Central. Lat. 23° S., *Chapman and Baines!*
Mozamb. Distr. Zambesi and Maravi country, *Dr. Kirk!* Zanzibar, lat. 6° S., *Speke and Grant!*

20. **C. Bororensis,** *Oliv.* An erect, slightly pubescent or strigillose herb of 2–4 ft. Leaves 3–5-foliolate; leaflets oblanceolate or oval, acute or acuminate, narrowed below, minutely pubescent or thinly strigillose, equalling or exceeding the petioles. Racemes bracteate; bracts simple or 3-foliolate. Pedicels spreading, about ½ in. Stamens 9–10 (6–8, *Klotzsch*). Capsule 3–4 in., narrow-linear, with forking striæ, slightly hairy or glabrate, narrowed into a slender style; gynophore about ½ in. Seeds nearly smooth and glabrous.—*Anomalostemon Bororensis*, Kl. in Peters' Mossamb. Bot. 162.

Mozamb. Distr. Boror, Zambesi, *Dr. Peters!*

Cleome ramosissima, Parlatore in Webb, Frag. Fl. Æthiop. 22, I have not satisfactorily identified. It is described as tall, shrubby, much-branched, glandular-pilose. Leaflets 3, ovate-lanceolate. Bracts simple, linear-oblong, rather obtuse. Capsules sessile, linear-oblong, glabrous. Immature seeds glabrous.
Nile Land. Sennar and Kordofan.

2. **GYNANDROPSIS,** DC.; Benth. et Hook f. Gen. Pl. i. 106.

Sepals 4, deciduous. Petals 4, unguiculate. Stamens about 6, inserted

upon the elongated gynophore. Ovary stipitate, 1-celled, with 2 multiovulate parietal placentas. Fruit and seeds as in *Cleome*.—Leafy herbs, with digitate, 3–7-foliolate leaves. Racemes bracteate. Flowers usually white or purple.

A small genus, common to the tropics of both hemispheres, artificially distinguished from *Cleome* by the insertion of the stamens upon the gynophore.

1. **G. pentaphylla** *DC. Prod.* i. 238. An erect herb of 1 or 2 ft. or sometimes shrubby below and taller, or reduced to 3 or 4 in.; the extremities and young leaves usually thinly pilose or pubescent. Leaves 5-foliolate; the upper 3-foliolate; leaflets obovate or oblanceolate, acute acuminate or obtuse, denticulate serrulate or entire. Racemes with simple or 3-foliolate bracts. Flowers white or purplish. Fruit narrow-linear, tapering into the style, usually puberulous or minutely setulose, 2–4 in. long; gynophore ¾ 2 in., with the scar of the stamens near the middle. Style variable in length or stigma subsessile.—*G. denticulata*, DC. Prod. i. 238. *Cleome acuta*, Schum. et Thonn. Guin. Pl. 293.

Upper Guinea. Senegambia; Sierra Leone, *E. Vogel!* Niger, *Barter!*
North Central. Kouka, *E. Vogel!* Bornou, *Oudney.*
Nile Land. Sennar, *Petherick! Schweinfurth;* Abyssinia, *Schimper!* and others.
Lower Guinea. Huilla, Golungo Alto, and Loanda, *Dr. Welwitsch! Wawra.*
Mozamb. Distr. Zambesia, *Drs. Kirk and Meller!* Mozambique, *Hulton!* 7–8° S. lat., *Speke and Grant!*

Common in waste places, in fields, and about villages. It is used as a pot-herb. A North African and Indian species, occurring also in the New World, but doubtfully indigenous there.

3. THYLACHIUM, Lour.; Benth. et Hook. f. Gen. Pl. i. 107.

Calyx closed at first, dehiscing transversely on expansion, the upper portion falling away. Petals 0. Stamens numerous (40–70), free, inserted upon a conical or short columnar torus. Ovary on a long gynophore with 4 10 multiovulate placentas, 1-locular or (owing to the development of spurious dissepiments from the placentas) submultilocular; stigma sessile, orbicular. Berry (described as) oblong, many-seeded.—Shrubs or small trees. Leaves alternate, simple or 3-foliolate; leaflets entire, panduriform or slightly lobed. Flowers rather large, corymbose.

A small genus confined to E. tropical Africa, Madagascar, and the islands of the E. coast.

1. **T. africanum,** *Lour.; DC. Prod.* i. 254. A bush or small tree, the bark of the extremities often punctate-scabrous. Leaves coriaceous, glabrous, 3-foliolate or simple; leaflets obovate oblanceolate or broadly oblong or oval, obtuse or scarcely acute, often mucronulate, entire (rarely lobed when simple), shortly petiolulate, articulated to the smooth or minutely verruculose petiole, which is also articulated at its base to the branch; central leaflet 2–4 in. long, ¾-1½ in. broad, the lateral usually considerably shorter. Flowers usually in few-flowered terminal corymbs or upon short axillary shoots, about 1 in. diam. Calyx glabrous, turbinate or obovoid and apiculate before expansion; persistent tube campanulate. Ovary sub-5-locular, 5 10-ridged or -angled, the ovules strictly parietal. Fruit not seen.—*T.*

ovalifolium, Juss. in Ann. Mus. xii. 71 (*ex* DC. l. c.). *T. querimbense* and *T. verrucosum*, Klotzsch in Peters' Mossamb. Bot. 163–4.

Mozamb. Distr. Shire river, Zambesia, *Dr. Kirk!* Querimba, *Peters!* M'Gæta river, 7–8° S. lat., *Speke and Grant!*

Nearly allied to *T. heterophyllum*, Juss. (*T. Sumangui*, Boj.), a Madagascar species.

4. MÆRUA, Forsk.; Benth. et Hook. f. Gen. Pl. i. 108.

(*Niebuhria*, DC.; Benth. et Hook. f. l. c. 107.)

Sepals 4, connate below in a tubular or infundibuliform tube, valvate in æstivation; lobes deciduous; tube more or less persistent. Petals 0 or 4, inserted in the mouth of the calyx-tube. Disk usually distinct, lining the calyx-tube, with or without a free toothed fimbriate or nearly entire margin. Stamens indefinite, inserted upon a columnar torus which usually equals or slightly exceeds the calyx-tube; filaments free. Ovary cylindrical linear oblong or ovoid, on a long gynophore, 1-celled or 2-celled owing to the meeting of the placentary plates; ovules indefinite, strictly parietal or inserted upon the spurious dissepiment; stigma sessile or subsessile. Fruit baccate, ovoid globose or narrow and torulose, the constrictions of the pericarp sometimes separating it into numerous 1-seeded segments. Seeds (which have been examined in very few species) are described as reniform or subreniform; cotyledons incumbent, convolute, sometimes fleshy.—Shrubs or small trees destitute of spines, glabrous or pubescent. Leaves simple or 3-foliolate, often with minute setaceous stipules. Flowers axillary solitary or fascicled, or in terminal racemes or corymbs.

A considerable genus extending from Senegal eastward through Arabia to India; occurring also at the Cape, in Madagascar, and the Islands of the Indian Ocean.

**Leaves all, or many of them, 3-foliolate.*

Petals present.

Extremities pubescent. Leaflets elliptical to ovate-lanceolate. Petals obovate. Fruit globose . . . . . 1. *M. triphylla.*

Glabrous or puberulous. Leaflets oval to oblanceolate, acute or obtuse. Petals obovate or oval . . . . . 2. *M. nervosa.*

Glabrous. Leaflets narrow-linear, 1–2 lines broad. Petals obovate, apiculate . . . . . 3. *M. Grantii.*

Petals 0.

Glabrous. Leaflets ovate to lanceolate, acuminate . . . . . 4. *M. acuminata.*

**Leaves simple.*

Petals present.

Leaves oblong or linear-oblong, 1½–3 in. Disk margin 0. Petals oval. Fruit torulose . . . . . 5. *M. oblongifolia.*

Leaves oblong or ovate-elliptical. Petals rotundate. Fruit subglobose . . . . . 6. *M. æthiopica.*

(See *M. rigida*, var. *buxifolia*.)

Petals 0.

Leaves lanceolate, ovate or obovate, 1–2¼ in. Ovary not pointed. Fruit torulose . . . . . 7. *M. angolensis.*

Branches rigid. Leaves small, ⅓–¾ in., obovate to linear-oval, scabrid or smooth. Ovary linear or clavate, not pointed. Fruit torulose 8. *M. rigida.*

Leaves obovate or oval, small, subretuse. Flowers solitary. Fruit not torulose (drupaceous) . . . . . 9. ? *M. uniflora.*
Leaves oblong or oblanceolate, obtuse, 1 in. or more. Ovary narrowed above . . . . . 10. *M. Curreri.*

1. **M. triphylla,** *Rich. Fl. Abyss.* i. 32; *Ic.* 7. A shrub or small tree, the extremities shortly pubescent. Leaves firmly membranous, usually 3-foliolate, the uppermost simple; leaflets broadly oval ovate-lanceolate or obovate-elliptical, rather acute or obtuse, mucronulate, more or less obtuse at the base, shortly petiolulate, minutely pubescent at least on the midrib beneath at first, at length glabrous, the central leaflet 1½–2 in. long in our specimens. Flowers in corymbose racemes terminating short axillary shoots towards the extremities of the branches. Calyx tubular-infundibuliform below the free minutely 4-toothed margin of the disk. Petals obovate or elliptical. Columnar torus equalling or exceeding the calyx-tube. Ovary oblong, 1-locular at first. Placentas 2, each with 8–12 ovules, a spurious dissepiment at length nearly dividing the cavity. Fruit globose, 4–6 lines diam., few-seeded, on a gynophore of about ¾ in.

Nile Land. White Nile, *Petherick! Kotschy,* and others.
Much resembles *M. (Niebuhria) linearis* of India, an apetalous species.

2. **M. nervosa,** *Oliv.* Shrub or small tree or a climber with slender drooping branches, glabrous or the extremities puberulous. Leaves rather coriaceous, usually 3-phyllous; median leaflet varying from ovate, broadly oval, oblong-oval to oblanceolate; apex acute obtuse minutely mucronulate entire or retuse, obsoletely puberulous at first or glabrous, 1–3 in. long, ¾–1 in. broad, lateral leaflets often considerably smaller; shortly petiolulate and articulated to the petiole. Flowers in terminal or axillary corymbose racemes, in the latter case sometimes panicled at the end of the branches or solitary; bracts minute. Petals obovate or elliptical, clawed. Columnar torus equalling or rather exceeding the infundibuliform calyx-tube, which is narrowly bordered with the toothed or lobed margin of the disk. Ovary oblong, 1-celled; placentas 2 (or 3), with about 15 ovules on each; stigma sessile. Fruit oblong-oval in our only fruiting specimen, 4–5 lines diam., on a gynophore of about 1 in.—*Niebuhria nervosa,* Hochst. in Flora 1844, 289. *Streblocarpus pubescens* and *S. scandens,* Klotzsch in Peters' Mossamb. Bot. 165.

Mozamb. Distr. Zambesia, *Dr. Kirk! Dr. Peters!* (? Zanzibar, *Dr. Kirk!*)
Grows also at Natal.
Var. *β. flagellaris.* Leaves often 1-foliolate, if 3-foliolate the median much larger; leaflets obtuse with a short decurved mucro, less veiny. Lake Nyassa and Shire river, *Dr. Kirk!*
In the glabrous scandent form the leaflets are sometimes distinctly marked with looping veins.

3. **M. Grantii,** *Oliv.* Glabrous, with slender virgate branches. Leaves 3-foliolate or the upper simple; leaflets narrow-linear, narrowed to the apex, shortly petiolulate, 1–2 in. long, 1–2 lines broad. Flowers on slender pedicels of about 1 in., axillary, solitary or a few together towards the extremities of the branches or of short slender lateral shoots. Calyx tubular below; free margin of the disk very short, interrupted. Petals obovate or elliptical, clawed, shortly apiculate. Columnar torus exceeding or equalling

the calyx-tube. Ovary ovoid or ellipsoidal, 2-locular owing to the meeting of the placentary plates; ovules about 6, strictly parietal or inserted upon the spurious dissepiment; stigma sessile. Fruit not seen.

Mozamb. Distr. 6°–7° S. lat., 38°–39° E. long., *Speke and Grant!*

4. **M. acuminata,** *Oliv.* Extremities slender, glabrous. Leaves 3-foliolate or the upper simple; leaflets petiolulate, rather coriaceous, ovate or ovate-lanceolate, acuminate, often tipped with a rather long slender mucro, base rounded or obtuse, glabrous; central leaflet usually larger, 2–3 in. long, 1–1½ in. broad. Petiolules often 2–3 lines. Flowers in axillary corymbose racemes towards the ends of the branches. Pedicels slender, about 1 in. long; bracts minute, subulate. Calyx-tube tubular below; free margin of the disk toothed, very short. Petals 0. Columnar torus equalling or exceeding the calyx-tube. Ovary ellipsoidal or oval, 1-celled, with 2 placentas, each with about 10 ovules in 2 rows; stigma sessile. Fruit not seen.

Mozamb. Distr. Rovuma river, *Dr. Kirk!*

5. **M. oblongifolia,** *Rich. Fl. Abyss.* i. 32. A shrub or small tree, the branches slender, glabrous smooth or minutely scabrid-puberulous. Leaves simple, rather coriaceous, oblong to narrow linear-oblong, obtuse or sometimes retuse, often mucronate, glabrous, 1½–3 in. long, 4–9-lines broad. Petiole 1 3 lines. Flowers in terminal racemes or corymbs or terminating short lateral shoots, the lower flowers in the axils of leaves, the bracts of the upper minute or obsolete. Calyx-tube tubular, rather shorter than or sometimes exceeding the oval rather acute lobes. Petals narrow-oval, clawed. Free disk-margin 0 or very minute, toothed. Columnar torus exceeding the calyx-tube. Ovary linear 1-celled with 2–multiovulate placentas; stigma sessile. Fruit interrupted or torulose, not exceeding 1 in. in length in our specimens, on a gynophore of ¾–1¼ in.—Rich. Fl. Abyss. Ic. 6. *Niebuhria oblongifolia,* DC. Prod. i. 244. *M. angustifolia,* Rich. in Fl. Seneg. 29. t. 8.

Upper Guinea. Senegambia, *Perrottet!*
North Central. Kouka, *E. Vogel!*
Nile Land. Abyssinia, *Schimper! Roth!* White Nile, *Speke and Grant!* Khartoum, *Brownell!*

Very nearly allied to the Indian *M. arenaria,* Hook. f. et Thoms. (*Niebuhria arenaria,* DC.; *Capparis heteroclita,* Roxb.), differing in its rather longer calyx-tube.

6. **M. æthiopica,** *Oliv.* An erect, virgately-branched, glabrescent shrub. Leaves subovate-elliptical to oblong, acute or obtuse, mucronate, glabrous excepting the puberulous midrib on the upper face, the larger 3 4-in. long. Flowers corymbose, disposed in lax, leafy panicles; pedicels and calyx densely puberulous. Segments of the calyx elliptical. Petals shorter, suborbicular, mucronate, shortly clawed. Stamens 2 2½ times longer than the calyx. Ovary ellipsoidal, at length subglobose, glabrous; ovules 3 6. Berry coriaceous, subglobose, obtusely apiculate. Stipes equalling or exceeding the pedicel.—*Niebuhria æthiopica,* Fenzl in Wien. Sitzungsb. li. (Extr. 4).

Nile Land. Sennar, *Kotschy!*

I have not seen this plant. The above description is taken from Dr. Fenzl's memoir, entitled 'Diagnoses prævim Pemptadis Stirp. Æthiop. novarum.'

7. **M. angolensis,** *DC. Prod.* i. 254. A shrub or small tree attaining 20–25 ft. Extremities glabrous or minutely pubescent, with a pale, smooth or minutely verruculose bark. Leaves simple, rather coriaceous, varying from lanceolate to ovate or obovate, obtuse retuse or rarely somewhat acute, usually mucronulate; base rounded obtuse or cuneate, glabrous or rarely scabrid-puberulous, usually from 1–2¼ in. long, ½–1¼ in. broad; petioles ½–1 in. Flowers in leafy corymbose racemes, terminating the branches or short lateral shoots, or solitary and axillary, when corymbose the bracts of the upper flowers are obsolete or reduced to minute stipular scales. Calyx-tube tubular, usually varying from about half as long to as long as the lobes. Corona toothed or fimbriate. Petals 0. Columnar torus equalling or exceeding the tube. Ovary linear; placentas 2, with indefinite ovules; stigma sessile. Fruit torulose or moniliform, from 1 or 2 to 6 in. in length, on a gynophore of 1–1½ in.—Deless. Ic. Sel. iii. 13. *M. senegalensis*, Brown in Denh. and Clapp. App. 21; Rich. in Fl. Seneg. 28. t. 7. *M. floribunda*, Fenzl in Flora, 1844, 312. *M. retusa*, Hochst., and *M. lucida*, Hochst. (ex Rich.) in Schimp. Pl. Abyss.

Upper Guinea. Senegambia, *Heudelot! Perrottet!* Nupe, on the Niger, *Barter!*
Nile Land. Abyssinia, *Schimper!*
Lower Guinea. Angola, *Dr. Welwitsch!*

Var. Leaves more acute.—Sennar, *Kotschy!*
Var. Leaves minutely scabrid.—Shire, *Dr. Kirk!*
Dr. Kirk adds that "the fruit is said to be poison."

Var. *heterophylla* (Welw.). Leaves varying from broadly elliptical to narrow-linear (5 in. long, 2 lines broad).—Loanda, *Dr. Welwitsch!*
M. angolensis occurs also in south extratropical Africa.

8. **M. rigida,** *R. Br. in Denh. and Clapp. App.* 21. A shrub or small tree, attaining (in Central Africa) 20–30 ft., with straight rigid terete branches, the lateral slender branches often terminating in acute points, minutely pubescent or glabrous. Leaves small, varying from obovate to linear-oval, obtuse or retuse and minutely apiculate or in narrow-leaved forms more or less acute, scabrid-puberulous or glabrous, ⅓–¾ in. long, 2–5 lines broad; petiole ½–2 lines. Flowers axillary, solitary or in fascicles of 2 or 3, or subcorymbose on short lateral shoots; pedicels equalling or exceeding the leaves. Calyx-tube much shorter than or equalling the elliptical lobes. Disk-margin fimbriate or obsolete. Petals 0 or minute, many times shorter than calyx-lobes. Ovary linear; stigma sessile. Ripe fruit (in the petaloid Angola plant) torulose, glabrous.

Var. α Leaves obovate, scabrid; calyx-tube nearly equalling lobes; petals 0; disk fimbriate.
Upper Guinea. Senegambia (*ex Rich.*).
North Central. Kouka, *E. Vogel!*

Var. β. (*virgata*, Welw.). Leaves linear-oval; petals 0; disk-margin obsolete.
Lower Guinea. Mossamedes, Angola, *Dr. Welwitsch!*

Var. γ. (*buxifolia*, Welw.). Leaves oblanceolate; petals minute.
Lower Guinea. Mossamedes, *Dr. Welwitsch!*

9. ? **M. uniflora,** *Vahl; DC. Prod.* i. 254. Branches smooth. Leaves about ½ in. long or less, succulent, cuneate-ovate or oval, somewhat retuse. Peduncles 1-flowered, solitary, slender, ½ in. long. Calyx 4-fid, glabrous;

tube urceolate, 4-gonous; segments oblong, obtuse, ciliate, reflexed. Corolla 0. Corona multifid. Stamens about 30. Ovary cylindrical, glabrous. Fruit ½ in. diam.

Dr. Schweinfurth states that a tree, entirely agreeing with this description (from Forskal, Fl. Ægypt. Arab. 104), is abundant in the Soturba district of Nubia (Fl. v. Soturba, 13). The name, however, is omitted in the enumeration of Nile Land plants appended to his Fl. Æthiop. He describes the fruit as fleshy and drupaceous, in size and form similar to that of the Almond. Forskal gathered his plant in Yemen, so that it may be expected on the western shores of the Red Sea.

10. **M. Currori,** *Hook. f. Fl. Nigrit.* 218. Branches glabrous, punctate. Leaves simple, rather coriaceous, oblong oval-oblong or oblanceolate, obtuse, mucronate, 1–1½ in. long, 4–6 lines broad; petioles ¼–½ in. Flowers in the axils of the upper leaves or corymbose. "Calyx-tube longer than the acute lobes. Corona petaloid, sub-2-partite." Ovary ovoid, narrowed above into a short point. Fruit not seen.

Lower Guinea. Elephant's Bay, W. tropical Africa, *Curror!*

The material is too imperfect for satisfactory description. The character of the free margin of the disk (corona) must remain uncertain. The form of the ovary, however, distinguishes it. In Dr. Welwitsch's Angola Herbarium there is a *Mærua* in fruit only, which in habit and foliage closely resembles the fragment of *M. Currori* in Herb. Kew; but the fruit is cylindrical-torulose, 2–3 in. long, and I can hardly suppose the ovoid ovary of *M. Currori* could acquire such a form. Dr. Welwitsch's specimens therefore probably belong to a distinct species.

Mærua crassifolia, Fenzl (Schweinf. et Asch. Enum.), I do not know. I presume it to be a mere manuscript name, probably applied to one of Kotschy's Nubian plants.

"*M. crassifolia*, V." Herb. Schweinfurth, from the shores of the Red Sea, I take to be *M. rigida*.

5. COURBONIA, A. Brongn.; Benth. et Hook. f. Gen. Pl. i. 969.

Sepals 3, sometimes 4 or 2, connate at the base in a very short, cylindrical or campanulate tube, valvate in æstivation. Disk with a short, toothed, free margin surrounding the mouth of the calyx-tube. Petals 0. Stamens indefinite, inserted upon a columnar torus which equals or exceeds the calyx-tube; filaments free, filiform; anthers ovoid or oblong, shortly apiculate. Ovary fusiform, on a long, slender gynophore, 2-celled or exceptionally 3-celled, owing to the meeting of the placentary plates; ovules 2 on each placenta, strictly parietal or inserted upon the spurious dissepiment. Fruit (seen only in one species) globose, coriaceous, indehiscent, 1- or few-seeded; seeds large, exalbuminous; cotyledons very thick, wavy on the inner face; radicle deeply included; testa papery, apparently abounding in barred cells.—Shrubs, with numerous, simple, glabrous, glaucous or glaucescent, entire, shortly petiolate, more or less coriaceous leaves. Flowers numerous, axillary, of moderate size. —*Physanthemum*, Klotzsch in Peters' Mossamb. Bot. 167. t. 29.

Confined to tropical Africa. The genus appears sufficiently distinct from *Mærua* in its normally trimerous calyx, in the form of the ovary, which tapers to each end, and in the seeds.

Leaves ovate or elliptical, obscurely 3–5-nerved at the base, obtuse or rather acute. Petioles 2–3 lines . . . . . 1. *C. decumbens.*
Leaves oval or linear-oval, acute, on petioles of 1 line or less . . . . 2. *C. virgata.*

1. **C. decumbens,** *A. Brongn. in Bull. Soc. Bot. France,* vii. 901. A glabrous, glaucous or glaucescent shrub, with long, slender, leafy branches. Leaves at length coriaceous, ovate or elliptical, obtuse or rather acute, mucronulate, base sometimes subcordate, obscurely 3–5-nerved below, 1–1½ in. long, about ¾ in (½–1 in.) broad; petiole 2–4 lines. Flowers solitary, axillary, about ¾ in. diam.; pedicels rather shorter than the leaves. Calyx 3- or rarely 2-partite; tube very short, campanulate, many times shorter than the apiculate or acute rather thin lobes. Petals 0. Disk-margin prominent, sinuate-toothed. Ovary fusiform, 2-celled (or exceptionally 3-celled), at least in the middle by the meeting or actual cohesion of the placentary plates. Fruit globose, with a coriaceous pericarp, 1–few-seeded, ¾–1 in. diam., on a gynophore of about 1 in. Seeds 6–10 lines long, 4–6 lines broad, consisting of two large fleshy cotyledons, convex on the back, wavy on the inner face, with a deeply-included radicle; testa papery.—*Physanthemum glaucum,* Klotzsch in Peters' Mossamb. Bot. 167. t. 29.

Nile Land. Madi, *Speke and Grant!* Abyssinia, *Courbon.*
Mozamb. Distr. Zambesia, *Drs. Peters, Kirk, and Meller!*

2. **C. virgata,** *A. Brongn. in Bull. Soc. Bot. France,* vii. 901. Perfectly glabrous and glaucous with virgate leafy branches. Leaves ascending, narrow- or linear-oval or lanceolate, acute, coriaceous, ¾–1¼ in. long, 2–5 lines broad, on very short petioles of 1 line or shorter. Flowers numerous, each in the axil of a leaf which often equals or exceeds the pedicel. Calyx-tube about one-sixth to one-fourth the length of the acute lobes, which appear to be normally 3 in number, though they vary with 4. Disk-margin toothed or lobed. Petals 0. Ovary fusiform, nearly or quite 2-celled; stigma sessile. Fruit not seen.—*Saheria virgata,* Fenzl (Schweinf. Fl. Æthiop. 74.)

Upper Guinea. Senegambia, *Heudelot!*
Nile Land. Sennar, *Kotschy! Cienkowski;* Abyssinia, *Schimper;* Nubia, *D'Arnaud, Sabatier.*

6. CADABA, Forsk.; Benth. et Hook. f. Gen. Pl. i. 108.

Sepals 4, free, in two series; the outer pair enclosing the inner. Petals 4 or 0, inserted on the torus, unguiculate. Stamens 4 or 5 (in the tropical species); filaments adnate more or less to the gynophore. Appendix springing from the base of the gynophore and often nearly at right angles to it, tubular, linguiform or ligulate, shorter or longer than the sepals. Ovary upon a long gynophore, 1-celled or 2-celled owing to the cohesion of the placentary plates; stigma sessile or subsessile. Ovules indefinite. Fruit cylindrical terete or subtorulose or ellipsoidal, sometimes dehiscing in two valves. —Shrubs unarmed or the desert species sometimes spinescent. Leaves simple, entire, glandular scabrid or glabrous. Flowers in terminal corymbs or racemes or axillary.—*Streemia,* Vahl, Symb. i. 19.

A small genus, chiefly confined to Africa, Arabia, India, Madagascar, and the islands of the Indian Ocean; one species reaches Australia. A Cape species, *C. (Schepperia) juncea,* is nearly or quite aphyllous.

Petals 0. Stamens 5, adnate to base of gynophore. Appendix ligulate.

Glabrous. Leaves rotundate, 1–1½ in. . . . . 1. *C. rotundifolia.*
Glandular-pilose or hispid. Leaves rotundate, ½–⅔ in. . . . . 2. *C. glandulosa.*
Petals present, clawed. Stamens 4 or 5, adnate ⅓–½ length of gynophore.
Mealy-puberulous at first. Leaves oblong, obtuse, often small. Appendix tubular. Stamens 4–5 . . . . . 3. *C. farinosa.*
Glabrous or extremities minutely mealy. Leaves linear-oblong or lanceolate. Stamens 4. . . . . 4. *C. longifolia.*
Extremities glandular-pilose. Leaves elliptical, scabrid or glabrate. Appendix tubular-infundibuliform, short. Stamens 5 . . . . 5. *C. Kirkii.*

1. **C. rotundifolia,** *Forsk.; DC. Prod.* i. 244. Extremities minutely puberulous. Leaves coriaceous, orbicular or rotundate, glabrous, with 1 or 2 pairs of the principal lateral veins from near the base; 1–1½ in. diam. on petioles of about ½–¾ in. Flowers in terminal racemes. Bracts subulate or obsolete. Petals 0. Appendix about ¼ in. long, ligulate, lamina elliptical, obtuse, folded back over its claw in bud. Stamens 5; filaments adnate 1–2 lines with the gynophore, which is at length ½–¾ in. long. Ovary 1-celled, placentas 2. Fruit linear, dehiscing in 2 valves, about 1½ in. long. Seeds reniform.—*Strœmia rotundifolia,* Vahl, Symb. i. 19.

Nile Land. Abyssinia, *Salt! Roth! Schimper,* and others; Nubia, *Bromfield!*
"Used as a drastic purgative in helminthiasis."—*Roth.*

2. **C. glandulosa,** *Forsk.; DC. Prod.* i. 244. A much-branched shrub, glandular-pilose with short, spreading, viscid hairs. Leaves orbicular, obovate or broadly elliptical, with or without a mucro, more or less shortly glandular-hispid or sometimes scabrid, usually 3–6 lines in diam., rarely twice as large. Racemes few-flowered, terminating the branches and lateral shoots. Petals 0. Appendix ¾–1 in. long, ligulate, the lamina petaloid, oblong obtuse or emarginate. Stamens 5, very shortly adnate to the base of the gynophore. Ovary 2-celled, owing to the cohesion of the placentary plates. Fruit oblong-ellipsoidal, ½ in. long or rather less, on a gynophore of ½–¾ in.—*Strœmia glandulosa,* Vahl, Symb. i. 20.

Nile Land. Nubia, *Kotschy!* Abyssinia, *Roth! Schimper (ex Rich.);* Kordofan, *Cienkowski;* Soturba, Nubia, *Schweinfurth!*
Also Arabian. A slightly scabrid or nearly glabrous variety occurs at Aden.

3. **C. farinosa,** *Forsk.; DC. Prod.* i. 244. A shrub or occasionally arborescent, often densely branched, the extremities terete, and more or less hoary-mealy. Leaves coriaceous in the desert forms, oblong oval-oblong or varying from lanceolate to oblanceolate-oblong, obtuse, emarginate or rarely somewhat mucronulate and acute, pale glaucous-green or whitish and mealy at first, at length glabrate, ½–2 in. long, ⅛–1 in. broad, in desert forms sometimes very small and fascicled; petiole about 1 line, rarely 3–4 lines. Flowers in short terminal racemes, or terminating short lateral branches. Bracts reduced to minute scales or obsolete, except the lowest, which is sometimes leafy. Petals 4, linear or narrow-oval clawed, exceeding or equalling the sepals. Appendix tubular, obliquely open, and often toothed at the extremity, shorter than or nearly equalling the sepals. Stamens 4–5; filaments adnate ⅓–½ way up the gynophore. Ovary cylindrical, 1-locular, with 2 placentas. Stigma sessile. Fruit patent, subterete or slightly torulose, 1–2 in. long, on a gynophore of ½–¾ in. or rather more. Seeds reniform-

rotundate, compressed.—Deless. Ic. Sel. iii. 8 (drawn with 6 stamens). *Strœmia farinosa*, Vahl, Symb. i. 20. *Cadaba dubia*, DC. Prod. i. 244. *Streblocarpus Fenzlii*, Parl. in Webb, Frag. Fl. Æthiop. 24.

Upper Guinea. Senegal, *Heudelot! Perrottet!*
North Central. Bornou, *Oudney;* Kouka, *E. Vogel!*
Nile Land. Madi, *Speke and Grant!* Abyssinia, *Schimper!* and others; Sennar and Kordofan, *Kotschy!* near Khartoum, *Heuglin.*
Extends through Arabia to N.W. India.

4. **C. longifolia,** *DC. Prod.* i. 244. A glabrous shrub or the extremities minutely mealy. Leaves rather coriaceous, linear oblong or lanceolate or elongate-oval, rather obtuse or subacute, often mucronulate, veiny when dry, usually from 1–2½ in. long, 3–6 lines broad; petiole 2–3 lines. Flowers in short terminal corymbs; bracts reduced to minute scales. Petals narrow-oval or lanceolate, with long claws, rather exceeding the sepals. Appendix linear-lanceolate or oblanceolate, about as long as the sepals, open on the side towards the gynophore. Stamens 4; filaments adnate, halfway up the gynophore or higher. Ovary minutely glandular, 2-locular, at least partially. —Rich. Fl. Abyss. Ic. 5. *Strœmia longifolia*, Br. in Salt's Abyss. App. 64.

Nile Land. Abyssinia, *Salt! Petit (ex Rich.), Plowden!*
Also at Aden.

5. **C. Kirkii,** *Oliv.* Extremities of the branches shortly glandular-pilose, puberulous or glabrate below. Leaves rather coriaceous, elliptical ovate- or obovate-elliptical, obtuse, usually mucronate, minutely hispid-scabrid, at length nearly glabrous, usually from 1–2 in. long, ¾ 1¼ in. broad, on petioles of 3 5 lines. Flowers numerous, in rather dense terminal racemes or sometimes corymbose. Bracts linear-subulate. Pedicels densely glandular-pilose. Petals linear-oval on long claws, exceeding the sepals. Appendix tubular-infundibuliform, shorter than the sepals. Stamens 5, adnate nearly half the length of the gynophore. Ovary 1-celled, with 2 multiovulate placentas.

Mozamb. Distr. Lake Nyassa and Shire valley, *Dr. Kirk!*

7. **EUADENIA,** Oliv.; Benth. et Hook. f. Gen. Pl. i. 969.

Sepals 4, open in æstivation. Petals 4, linear-spathulate, lanceolate, plane (or ovate-lanceolate, undulate and crisped), narrowed below into a long claw, 2 very much larger. Stamens 5–7; filaments free or very shortly connate around the base of the gynophore (or adnate to above its middle); anthers linear-oblong. Staminodia 0 2. Appendix at the base of the gynophore narrow-linear, plane or channelled, terminating in about 5 minute, spherical knobs (or divided above into as many narrow segments, each bearing a small oblong appendage). Ovary linear-oval or (ovoid) glabrous, (1-celled or) 2-celled, with a spurious dissepiment; ovules indefinite, parietal; gynophore equalling the appendix (or many times longer). Stigma sessile, truncate, emarginate or subpeltate, depressed in the centre. (Fruit only seen in *E.? Kirkii*, in which it is nearly globose and about 4 in. diam. above, and abruptly narrowed into the subcylindrical lower half. Seeds rather large,

indefinite, imbedded in pulp.)—Glabrous, unarmed shrubs. Leaves trifoliolate. Flowers in terminal corymbs or racemes.

Allied in habit and in the calyx to *Crataeva*, from which the appendix of the torus and the number of stamens distinguish it. These characters ally it, on the other hand, to *Cadaba*, but the calyx is very different. The genus is based upon the West African species, of which I have unfortunately not seen ripe fruit. The bracketed characters apply to *E.? Kirkii*.

Larger petals oval- or linear-spathulate. Stamens inserted upon the torus or very shortly adherent to the base of the gynophore. Ovary 2-celled . . . . . 1. *E. trifoliolata*.

Larger petals lanceolate or ovate-lanceolate, crisped. Stamens adnate about two-thirds the length of the gynophore. Ovary 1-celled . . 2. *E.? Kirkii*.

1. **E. trifoliolata,** *Oliv.* A leafy, glabrous shrub of 6–8 ft. or sometimes attaining 30 ft. Leaves 3-foliolate, on petioles often 6 in. long or longer; leaflets membranous elliptical, the central one narrowed below, the lateral more or less ovate-elliptical and oblique at the base, 3–6 in. long, 1–2½ in. broad, petiolulate. Flowers in terminal racemes. Bracts subulate, early deciduous. Sepals lanceolate, rather unequal. Larger petals oval- or linear-spathulate, 1½–3 in. long, green at first. Fertile stamens 5; sterile 0 or 2. Ovary linear-oval, glabrous. The most advanced fruit which I have seen is about 1½ in. long, on stipes of 1 in.—*Stræmia trifoliata*, Schum. et Thonn. Guin. Pl. 114.

Upper Guinea. Forests, Abbeokuta, *Barter!* Guinea, *Thonning*. Camaroons mountain (3000 ft) and Old Calabar river, *Mann!*

There is a leafless specimen in Herb. Kew from the Bagroo river (*Mann*), which may belong to another species allied to the above. The flowers are in a short subumbellate raceme, on long, spreading or ascending pedicels, the larger petals about 3 in.

2. **E.? Kirkii,** *Oliv.* A bush or small tree, sometimes attaining 18 ft. Leaves 3-foliolate, glabrous; leaflets oval, attenuated to each end. Flowers pale yellowish yellow-green or nearly white, in loose corymbs. Two larger petals ovate-lanceolate or oval, undulate and crisped on the margin, tapering above and below, with a distinct midrib. Appendix diverging from the base of the gynophore, equalling or exceeding the sepals, apparently divided above into 5 filiform segments, each bearing an oblong appendage. Gynophore nearly twice as long as the larger petals, with the 7 filaments adherent about two-thirds of its length. Ovary ovoid, 1-celled, with indefinite ovules in 2 multiovulate placentas. Fruit with a coriaceous pericarp; the upper part somewhat globose, too abruptly narrowed below to be pyriform, many-seeded; seeds ⅓–½ in. diam., globose-reniform, variously compressed. Cotyledons large, fleshy, curved, radicle very short.

Mozamb. Distr. Lupata, *Dr. Kirk*.

No specimens appear to have reached home, excepting of the fruit. The general description is from a drawing and the notes of Dr. Kirk. It differs from the western species in the adhesion of the filaments to about two-thirds of the length of the gynophore, in the 1-celled ovary, and probably in the fruit, judging from the indication afforded by a very young fruit of *E. trifoliolata* in the Kew herbarium. It may prove the type of a new genus, though I think it would be premature to separate it at present.

8. **BOSCIA,** Lam.; Benth. et Hook. f. Gen. Pl. i. 108.

Sepals 4, free to the base or very nearly so, valvate in æstivation, deci-

duous. Petals 0. Disk forming an entire or fimbriate ring at the base of the calyx. Stamens 6–20, free, inserted upon the torus or at the base of the short gynophore (in the tropical African species). Ovary ovoid or obpyriform, narrowed into a very short thick style, 1-celled with 2 (or 1) placentas and few ovules. Fruit crustaceous, globose, shortly stipitate or subsessile, 1- or few-seeded. Embryo more or less convolute, the cotyledons contortuplicate in the few specimens examined.—Shrubs or small trees, glabrous or minutely pubescent or scabrid. Leaves simple, entire, coriaceous. Flowers small racemose or fascicled, sometimes collected in terminal panicles.

A small African genus closely allied to *Mærua*, from which it may generally be distinguished by the free or nearly free sepals and the ovary narrowed above into a very short style. *Boscia Caffra*, Sond., of the Cape is a *Mærua* (*Niebuhria*).

Leaves oblong-elliptical obtuse or rather acute, 2–5 in. Flowers racemose or subumbellate, in terminal panicles. Stamens 8–20 . . 1. *B. senegalensis.*
Leaves oblong or oval, acute or obtuse, 1–2 in. Flowers racemose or corymbose, axillary or terminal: Stamens 6–9 . . . . . 2. *B. angustifolia.*
Leaves elongate-linear or -lanceolate, usually acute, 2–5 in. Flowers in axillary racemes. Stamens 9–14 . . . . . 3. *B. salicifolia.*
Leaves oblong-elliptical, scabrous, 2–5 in. Flowers in erect terminal racemes. Stamens 14–20 . . . . . 5. *B. urens.*
Leaves small, fascicled, obovate-oblong, 3–6 lines. Flowers fasciculate. Stamens 6 . . . . . 4. *B. microphylla.*

1. **B. senegalensis,** *Lam.; DC. Prod.* i. 244. A shrub or small tree. Branches glabrous or minutely pubescent at first. Leaves coriaceous, oblong-elliptical or broadly oval, obtuse or rather acute, reticulate, glabrous or very shortly pubescent and soft to the touch beneath, the principal lateral veins more or less distinctly looped; 2–5 in. long, 1–1½ in. broad. Petiole about 3 lines. Flowers racemose or subumbellate, collected into small terminal panicles. Stamens 8–20, inserted within the thickened disk at the base of the gynophore which is about 1½ lines in length. Fruit globose, 4 6 lines diam., 1–3-seeded, glabrous or pubescent-tomentose.—*B. octandra*, Hochst. in Kotschy, Pl. Nub.

Upper Guinea. Senegambia, *Perrottet!*
North Central. Kouka, *E. Vogel!*
Nile Land. Nubia, *Kotschy!* Kordofan, Sennar, *Cienkowski.*

2. **B. angustifolia,** *Rich. in Fl. Seneg.* 26. *t.* vi. (*non Harvey*). A tree or shrub with glabrous branches. Leaves coriaceous, oblong oval linear-oval or varying from obovate to lanceolate, obtuse retuse or acute, usually mucronate, more or less narrowed to the base, minutely or obsoletely reticulate and glabrous or very minutely pubescent beneath, often in fascicles of 2–4, from nodes on the branches of a previous year, 1–2½ in. long or more. Petioles 1½ 3 lines. Flowers greenish, fragrant, corymbose or racemose, axillary and lateral or collected in short terminal panicles; bracts subulate or filiform. Stamens 6 20 or more, inserted within the fimbriate or thickened cushion-like disk at the base of the short gynophore. Ovary ovoid, 1-celled, with 2 placentas; ovules few. Fruit globose, 3–6 lines diam., glabrous or minutely pubescent, pitted or rugulose, 1–few-seeded, sometimes nearly sessile. Embryo convolute with contortuplicate cotyledons.—*B. senegalensis?*

and *B. reticulata*, Hochst. in Schimp. Pl. Abyss. *B. intermedia*, Hochst. (ex Rich.). *B. Mossambicensis*, Klotzsch in Peters' Mossamb. Bot. 164.

Upper Guinea. Senegambia! Niger, *Barter!*
Nile Land. Abyssinia, *Schimper!* and others; Kordofan, *Kotschy! Cienkowski.*
Lower Guinea. Bumba, Angola, *Dr. Welwitsch!*
Mozamb. Distr. Zambesia, *Dr. Kirk!*
This plant may prove a variety of *B. senegalensis*. *B. angustifolia*, Harv. Fl. Cap. i. 19. Thes. Cap. t. 134, does not belong to the genus. The specimens from Abyssinia and the Niger have smaller flowers and fewer stamens than the rest.

3. **B. salicifolia,** *Oliv.* A shrub, sometimes arborescent. Branches glabrous or the extremities puberulous. Leaves elongate, linear linear-oval or -lanceolate, acuminate acute or sometimes obtuse, minutely puberulous or scabrid at first, glabrous at length or still rough to the touch on the upper surface, usually 2–5 in. long, 5–9 lines broad. Petiole 3–6 lines. Flowers racemose, racemes axillary, ¼–½ the length of the leaves or upon short lateral shoots, glabrous or pubescent. Pedicels 1 or 2–6 lines; bracteoles minute, subulate, early deciduous. Sepals reflexed. Stamens 6–14, inserted within the annular disk. Ovary ovoid or obpyriform, narrowed into a very short style, 1-celled with 2 placentas; gynophore ½–1½ lines. Fruit not seen, probably 1-seeded.

Nile Land. Madi, White Nile, *Speke and Grant!*
Lower Guinea. Mossamedes, Angola, *Dr. Welwitsch!* (a form with leaves 1–1½ in. long).
Mozamb. Distr. Shire river, *Dr. Kirk!*
In the specimen from Madi the flowers appear to expand as soon as or before the leaves, and the pedicels are longer, but I do not find any sufficient ground for specific distinction. Dr. Kirk states that the knotty root is boiled and eaten on the Shire. Can this be the doubtful *Capparidea* with the habit of a Pine, figured and referred to by Schweinfurth (Pl. Nilot. 18. tt. 6 and 14)?

4. **B. microphylla,** *Oliv.* A glabrous shrub or small tree, often with spinose branches. Branches terete. Leaves small, fasciculate or scattered on the young shoots, coriaceous, oblong-obovate or oblanceolate or nearly linear, obtuse, mucronulate, venation indistinct, 3–8 lines long, on petioles of half a line, more or less. Flowers numerous, in lateral fascicles or umbellate racemes, equalling or but little exceeding the leaves, nearly glabrous or the pedicels pubescent. Stamens about 4–6, inserted at the base of the gynophore. Ovary globose-ovoid with a short thick style; placentas 2. Stigma obtuse. Fruit not seen.

Lower Guinea. Bumbo, Angola, *Dr. Welwitsch!*
South Central. S.W. tropical Africa, about lat. 23°, *Chapman* and *Baines!*

5. **B. urens,** *Welw. mss.* Extremities pubescent. Leaves coriaceous, oblong-elliptical, obtuse, often mucronulate, sometimes rather pointed; base rounded or cuneate, scabrous or rugose-scabrous above, shortly hirsute-pubescent beneath, in the rugose forms with prominent midrib and lateral veins below, at length 2–4½ in. long, ½–1¾ in. broad. Flowers in erect, more or less elongate terminal racemes, often several inches in length; bracts minute, subulate. Pedicels spreading or ascending, ⅛–½ in. Calyx-lobes ovate, hairy externally with a broad annular disk at base. Stamens 14–20.

Gynophore about ¼ in. Ovary ellipsoidal or ovoid, very shortly and obtusely pointed, the outer layer (epicarp) as it enlarges into the globose (½–¾ in. diam.) fruit, becoming resolved into a compact pile of pungent flattened setæ.

Lower Guinea. Loanda, Angola, *Dr. Welwitsch!*

There is at Kew a specimen from Richard's Herbarium, communicated by Count Franqueville, named *Boscia pubens*, Rich. It is in fruit only, so that I cannot be sure of the genus. It resembles *B. angustifolia* in habit. The leaves are lanceolate-oblong, mucronate, about 2½ in. in length. It was collected in Abyssinia by Dillon and Petit.

9. CAPPARIS, Linn.; Benth. et Hook. f. Gen. Pl. i. 108.

Sepals 4 (very rarely 5), free or connate at the base (or united and splitting irregularly in some species not tropical African), equal or the two outer broader and more concave or the two inner petaloid, imbricate or valvate, or in two series, the outer pair valvate in æstivation. Petals 4. Stamens indefinite (8–∞), inserted upon the torus. Filaments free. Ovary upon a gynophore usually from ¼–2 in. in length, 1-celled or sometimes few-celled, with 2 or more parietal placentas; ovules usually indefinite; stigma sessile. Fruit stipitate with one or many seeds, indehiscent or sometimes separating into 3 or 4 valves.—Trees or shrubs, often climbing or sometimes prostrate, unarmed or with short, often recurved, stipular spines. Leaves simple, coriaceous or submembranous, rarely wanting. Flowers usually hermaphrodite, solitary, racemose, corymbose or umbellate, axillary or terminal.

A large genus widely spread through the tropics and warmer regions both of the New and Old World. The nine or ten principal subdivisions of the genus are principally based upon differences in the sepals. Three of these subgenera are represented in tropical Africa. Several peculiar species grow at the Cape. Of the tropical African species four at least are common to India, but none to America.

A. Sepals equal or nearly equal in length, the two outer sometimes broader or more deeply concave.

**Extremities usually armed with short stipular spines.*

Leafless, at least the flowering branches. Flowers in fascicles or corymbs. Anterior sepal saccate. (Sect. *Sodada.*) . . . . 1. *C. aphylla.*

(Sect. *Eucapparis.*)

Trailing. Leaves rotundate. Flowers large, axillary, solitary . . 2. *C. spinosa.*

Trailing. Leaves ovate to rotundate with curved mucro. Flowers large, axillary, solitary. Anterior sepal galeate . . . . . 3. *C. galeata.*

Leaves elliptical or ovate-oblong. Flowers axillary solitary or in terminal corymbs. Sepals usually tomentose or pubescent externally; stigma much narrower than the ovary . . . . . 4. *C. tomentosa.*

Leaves ovate or elliptical, not acuminate, usually pubescent, coriaceous. Flowers in lateral or terminal corymbs or umbels. Sepals glabrous externally; stigma minute . . . . . 5. *C. corymbosa.*

Leaves membranous, ovate, acuminate, glabrate. Flowers axillary, 1–3 . . . . . 6. *C. viminea.*

Leaves oblong-elliptical, shining above. Flowers in pedunculate umbellate or corymbose axillary and terminal racemes; stigma nearly as broad as the ovary. (Flowers sometimes staminate only) . . . . . 7. *C. Thonningii.*

Leaves ovate-oblong. Flowers in axillary, sessile or subsessile fascicles of 4–6. Pedicels and calyx pilose-tomentose . . . . . 8. *C. Rothii.*
Glaucescent. Leaves oblong-lanceolate, obtuse, emarginate. Flowers small, subcorymbose . . . . . 9. *C. micrantha.*

**Extremities usually destitute of stipular spines.*

Leaves ovate or ovate-lanceolate with a reflexed mucro. Flowers in axillary or terminal corymbs or racemes. Fruit oval-oblong . . 10. *C.? reflexa.*
Leaves 3–4 in., obovate or obovate-oblong, on very short petioles, scabrid above. Flowers in terminal umbels. Petals short . . 11. *C. Kirkii.*

B. Two outer sepals much shorter than the two inner (which are petaloid) after expansion. Flowers axillary, solitary. Ovary angular or winged. Usually with stipular spines. (Sect. *Petersia.*)
Leaves elliptical obtuse or acuminate. Outer sepals enclosing the bud, about half as long as the inner after expansion. Ovary glabrous . . . . . 12. *C. erythrocarpa.*
Leaves elliptical, obtuse. Outer sepals spreading before expansion of the bud, about one-third or a quarter as long as the inner after expansion. Ovary tomentose . . . . . 13. *C. rosea.*

1. **C. aphylla,** *Roth, Nov. Pl. Sp.* 238. A much-branched, glabrous tree or shrub. Branches terete, leafless, excepting in young plants and on barren shoots, usually with short, nearly straight or ascending, stipular spines. Leaves, when present, linear or linear-lanceolate. Flowers about 1 in. diam., in lateral and terminal fascicles or corymbose racemes. Pedicels ½ in. or shorter. Sepals unequal in breadth; the anterior outer sepal larger and deeply saccate, but slightly imbricate or subvalvate (at least the 2 outer) in æstivation. Ovary on a gynophore of ½–¾ in. Style about half as long as the ovary. Fruit ovoid, pointed or subglobose, several- or many-seeded. —*C. Sodada,* Brown in Denham and Clapp. App. 20. *Sodada decidua,* Forsk. Fl. Ægypt. 81; Delile, Fl. Ægypt. t. 26.

North Central. Bornou, *Oudney* (*Brown*).
Nile Land. Nubia, *Schweinfurth!* Abyssinia, *Schimper!* Sennar.
Extends eastward through Arabia to India.

2. **C. spinosa,** *Linn.; DC. Prod.* i. 245. A glabrous or more or less tomentose, trailing shrub; the extremities usually puberulous or tomentose, armed with recurved or nearly straight, stipular spines. Leaves coriaceous, rotundate or from broadly obovate to broadly ovate, retuse or entire, mucronate, pale green or glaucescent, ½–1¼ in. diam.; petiole 1–2 lines. Flowers large, 1–3 in. across, axillary, solitary or forming loose, unilateral, leafy racemes. Peduncles equalling or exceeding the subtending leaf. Sepals subequal in length, the two outer deeply concave or the anterior more deeply saccate. Petals white, exceeding the sepals. Fruit oval-oblong or clavate, on a strong gynophore of 1½ in., separating at length into 3 or 4 valves. —*C. ægyptia,* Lam. Dict. i. 605; Delile, Fl. Ægypt. t. 31. f. 3.

Nile Land. Kordofan, *Kotschy!*
Spreading through the Mediterranean region and Egypt, it extends eastward to Western India. For extended synonymy see Anderson in Linn. Soc. Journ. v. Suppl. i. 5, and Hook. f. et Thoms. Fl. Indica (*incd.*). The buds are pickled as "capers."

3. **C. galeata,** *Fresen. in Mus. Senck.* ii. 111. A glaucous, leafy, dif-

fuse shrub; extremities pulverulent. Leaves thick and cartilaginous, ovate to rotundate, tipped with a more or less curved or hooked mucro, 1–3 in. long, ¾–2 in. broad. Stipules spinose. Flowers solitary, axillary; peduncles stout, recurved in fruit. Sepals 4, the larger galeate. Petals roundish. Fruit baccate, clavate-pyriform, 3–4 in. long, on a stipes of about 1½–2 in. Seeds reniform.

For synonyms (*C. cartilaginea*, Decaisne in Ann. Sc. Nat. Ser. 2. iii. 273, etc.) see Anderson in Journ. Linn. Soc. v. Suppl. i. 5.

Nile Land. Abyssinia, *Schimper;* Nubia, *Schweinfurth!*
Also in Egypt, Arabia, and Western India.
Very nearly allied to *C. spinosa*, as remarked by Dr. Anderson.

4. **C. tomentosa,** *Lam.; DC. Prod.* i. 246. A pubescent, tomentose or sometimes glabrous shrub; the branches usually armed with recurved, stipular spines. Leaves elliptical or ovate-elliptical or ovate-oblong, obtuse or subacute, pubescent or glabrous or pubescent-scabrid above, 1–3 in. long, ¾–1½ in. broad; petioles 2–5 lines. Flowers either axillary and solitary or collected into terminal corymbs or racemes, the lower usually in the axils of leaves, the upper with linear bracts. Sepals subequal, rotundate, concave, more or less tomentose externally, sometimes glabrescent. Petals exceeding the sepals. Stamens indefinite. Ovary ovoid, usually glabrous, very shortly or scarcely pointed; stigma sessile or subsessile, much narrower than the ovary; gynophore 1–1½ in. long. Fruit not seen.—*C. puberula*, DC. Prod. i. 248. *C. polymorpha*, Rich. in Fl. Seneg. 24. t. 5. *C. persicæfolia*, Rich. Fl. Abyss. i. 31.

Var. *α*. Leaves pubescent. Flowers axillary.
Upper Guinea. Senegambia, *Sieber! Perrottet!*
North Central. Kouka, *E. Vogel!*

Var. *β*. Leaves pubescent. Flowers in terminal corymbs, on pedicels of 1–1½ in. (connected by intermediates with var. *α*. Scarcely distinct from *C. grandis*, Linn. f., of India).
Upper Guinea. Senegambia, *Heudelot! Brunner!*
Nile Land. Abyssinia (*Rich.*); White Nile, *Speke and Grant!*
Lower Guinea. Angola, *Dr. Welwitsch!*
South Central. Lake Ngami, *M'Cabe!*

Var. *γ*. Leaves glabrous or glabrescent. Flowers in terminal corymbs.
Nile Land. Abyssinia, *Schimper!* and others.

Var. *δ*. Leaves larger, at length shining above, minutely pubescent beneath.
Upper Guinea. Island of St. Thomas, *Mann!* This form much resembles the yet more glabrous *C. Roxburghii*, DC., of India.

5. **C. corymbosa,** *Lam.; DC. Prod.* i. 247. Shrub. Branches with short, recurved, acute, stipular spines, usually shortly and softly pubescent, at least at first. Leaves ovate ovate-lanceolate or elliptic-oblong, emarginate or obtuse, sometimes mucronulate, obtuse rounded or slightly cordate at the base, shortly pubescent or glabrate, ¾–1½ in. long, 5–9 lines broad; petiole 1–2 lines. Flowers in lateral or terminal, sessile or shortly pedunculate fascicles of 4–6, or one or two lower flowers axillary, solitary; pedicels about ½ in. Calyx nearly glabrous externally. Sepals elliptical, concave, equal. Petals rather exceeding the sepals, narrowed to the base, pilose below, especially on the inner surface. Ovary ovoid, usually rather oblique, pointed

with a minute stigma, 1-celled, with 2 placentas; on a gynophore of about ½ in.—*C. fascicularis*, DC. Prod. i. 248 (*C. Brassii*, DC. l. c. apparently the same, but the specimen very indifferent).

Upper Guinea. Senegambia, *Perrottet!* Cape Coast!
North Central. Bornu, *E. Vogel!*
Nile Land. Sennar, *Kotschy!* Abyssinia, *Ferret and Galinier.*

Var. *subglabra*. Loanda, *Dr. Welwitsch!*
Scarcely specifically distinct from *C. sepiaria*, Linn. The flowers are rather larger than in that species. I have not had the opportunity of comparing the fruit.

6. **C. viminea,** *Hook. f. and Thoms. Fl. Ind.* (*ined.*) A slender shrub, with finely striate, glabrous or glabrate, leafy ramuli. Stipular spines very short, recurved. Leaves membranous, ovate-elliptical or ovate, acute or acuminate or the apex sometimes obtuse, rounded at the base, glabrous or obsoletely pubescent at first, 2–4 in. long, 1–2 in. broad; petiole 1–2 lines. Flowers axillary, in fascicles of 1–3; pedicels slender, ½–1 in. Buds glabrous. Two outer sepals nearly equalling the bud at expansion, one more or less deeply concave below. Petals tomentose externally. Ovary ovoid, pointed, glabrous. Fruit not seen (globose, "size of small cherry" in the Indian plant).

Lower Guinea. Golungo Alto, Angola, *Dr. Welwitsch!*
Occurs also in the Eastern Himalaya and at Tenasserim.

7. **C. Thonningii,** *Schum. in Schum. et Thonn. Guin. Pl.* 236. A shrub. Extremities minutely pubescent or glabrate. Stipular spines very short recurved acute. Leaves firmly membranous, oblong-elliptical or oblong-lanceolate, rather obtuse or emarginate, glabrous and shining above, puberulous or glabrate beneath, 1¾–2½ in. long, ¾–1¼ in. broad; petiole about 2 lines. Flowers white, fragrant, in pedunculate umbels or corymbose axillary and terminal racemes, sometimes panicled towards the ends of the branches. Peduncles ½–2 in.; pedicels ¼–½ in. Sepals concave, free, equal. Petals about equalling the sepals. Ovary ovoid or ellipsoidal, on a gynophore of 2–3 lines; stigma sessile, as broad or nearly as broad as the ovary. Fruit globose, orange-coloured, about ½ in. diam. or rather less, on a short stipes; several-seeded.—*C. linearifolia*, Hook. f. Fl. Nigrit. 217.

Upper Guinea. Abbeokuta, *Irving!* Niger, *Barter!* Guinea, *Thonning.*
Dr. Thomson points out that this species is very nearly allied to *C. floribunda*, Wt., an Indian species, which differs in wanting the very broad stigma. The same character distinguishes it from *C. sepiaria*, Linn., a common Indian species, to which it is also allied.

8. **C. Rothii,** *Olir.* Shrub. Extremities at first puberulous, with very short, recurved prickles. Leaves ovate-oblong or lanceolate, obtuse or emarginate, mucronulate, loosely pilose beneath at first with a deciduous tomentum, at length glabrous, about 1½ in. long, 7–8 lines broad in our specimen; pedicels 2–3 lines. Flowers in axillary sessile fascicles of 4–6. Pedicels about ¼ in. long, with the calyx more or less pilose-tomentose with reddish hairs. Sepals nearly equal. Stamens about 20. Ovary ovoid or ellipsoidal, shortly and obtusely pointed.

Nile Land. Abyssinia, *Dr. Roth!*
The deciduous, reddish tomentum of the pedicels and sepals recalls *C. chrysomeja*, Boj. (*C. solanoides*, Boj. mss.), of Madagascar.

9. **C. micrantha,** *Rich. Fl. Abyss.* i. 31. Glaucescent. Leaves elongate, oblong-lanceolate, obtuse and emarginate, base obtuse; short petiole and under surface puberulous, 2 in. long, $\frac{1}{3}$–$\frac{1}{2}$ in. broad. Stipular spines recurved. Flowers small, 3–5, subcorymbose, pedunculate, terminating pilose branchlets. Sepals deeply concave, glabrous.

Nile Land. Abyssinia, *Dillon;* Bahr-el-Abiad (*Schweinf. et Asch. Enum.*).
Copied from Richard.

10. **C. reflexa?** *Schum. et Thonn. Guin. Pl.* 237. An unarmed, much-branched shrub, with punctate-scabrid bark. Leaves ovate or ovate-lanceolate, veiny, glabrous, with a reflexed mucro. Petiole short. Flowers in axillary or terminal corymbose racemes; pedicels thickened upwards, 1 in. or rather longer. Bracts small, caducous. Calyx 4-partite. Petals twice as long as the calyx, linear-lanceolate, acuminate. Ovary oblong, on a gynophore about as long as the filaments. Stigma subcapitate, sessile. Fruit oval-oblong, $1\frac{1}{2}$ in. long, obtuse, terete, smooth (not torulose), glabrous.

Upper Guinea. On the coast region, here and there, *S. and T.*
This plant is known to me only from the description of the above authors. Can it be a *Mærua?*

11. **C. Kirkii,** *Oliv.* A leafy shrub of about 8 ft. in height. Extremities minutely pubescent-scabrid, unarmed. Leaves coriaceous, rather large and often crowded on the branches, obovate-oblong or varying from obovate to oblanceolate; apex rounded obtuse or sometimes subacute, mucronate, usually narrowed to the obtuse or subcordate base, scabrous above, strongly reticulate with a prominent midrib and very shortly pubescent beneath, 3–4 in. long, 1–2 in. broad above the middle; petiole about 1 line. Flowers numerous in terminal umbels or umbellate corymbs. Pedicels shortly pilose, about 1 *in.* long. Sepals subequal, obovate obtuse, united at the base into a very short tube. Petals obovate-elliptical, sessile, rather shorter than the sepals. Stamens indefinite. Ovary narrowed below into the gynophore of about 1 inch, very shortly and obtusely pointed, 1-celled. Young fruit subglobose.

Mozamb. Distr. By Lake Nyassa and Upper Shire river (1500 ft.), *Dr. Kirk!*
A remarkable plant and very distinct from any other tropical African species. The sepals appear to be imbricate in æstivation, but I have not had good buds to examine.

12. **C. erythrocarpa,** *Isert; DC. Prod.* i. 246. A climber. Branches terete, pubescent or glabrous, with small, recurved, stipular spines. Leaves elliptical, obtuse, minutely emarginate or sometimes acute or shortly acuminate, glabrous or pilose-tomentose or pubescent, at length glabrate, firmly membranous or at length somewhat coriaceous, $1\frac{1}{2}$–3 in. long, $\frac{3}{4}$–$1\frac{1}{2}$ in. broad; petiole 1–3 lines. Flowers usually axillary, solitary, about 2 in. across, on peduncles of $\frac{1}{4}$–$\frac{3}{4}$ in. Two outer sepals concave, valvate, in æstivation enclosing the bud; inner sepals resembling the petals, about twice as long as the outer after expansion, oval-oblong or oblanceolate, about 1 in. in length. Petals more or less pilose-tomentose. Ovary ovoid or lanceolate-ovoid, glabrous or nearly so, with about 6–8 strong, somewhat winged, longitudinal ridges, 1-locular, on a gynophore of about 1 in. Stigma broad, sessile or subsessile, truncate. Fruit hexagonal, scarlet, about the size of a walnut.—*C. Afzelii,* DC. Prod. i. 246.

Upper Guinea. Guinea, *Thonning*; Accra, *T. Vogel!* Sierra Leone, *Afzelius!* Gambia, *Whitfield!*
Nile Land. White Nile, *Murie!*
Lower Guinea. Angola, various provinces, *Dr. Welwitsch!* Congo, *Smith!*

13. **C. rosea,** *Oliv.* Extremities pilose-tomentose at length glabrate, with very short, rather recurved, stipular spines. Leaves elliptical, obtuse, mucronulate, pubescent or sparsely tomentose at first, at length glabrate and rather coriaceous, 1–1½ in. long or less, 5–7 lines broad; petiole 1–2 lines. Flowers axillary, solitary, 1–1½ in. across, on peduncles of ¼–½ in. Sepals concave, tomentose externally, spreading or recurved, and much shorter than the bud before expansion. Inner sepals petaloid, 3–4 times longer than the outer sepals. Stamens indefinite. Ovary oblong-ovoid, with about 8 strong longitudinal ridges, tomentose. Stigma sessile, truncate, nearly as broad as the ovary. Fruit ellipsoidal, strongly ridged, very shortly narrowed at each end, on a stipes of 1 in.—*Petersia rosea*, Kl. in Peters' Mossamb. Bot. 168. t. 30.

Mozamb. Distr. By Lake Nyassa and Zambesi, *Dr. Kirk!* Rios de Sena, *Peters!*

10. **CRATÆVA,** Linn.; Benth. et Hook. f. Gen. Pl. i. 110.

Calyx 4-partite; lobes distinct from the base and open in æstivation in the African species. Petals 4, elliptical or ovate, penniveined, with a long claw. Stamens usually 16–20, inserted on the more or less dilated torus; filaments free, filiform. Ovary ovoid or globose on a long gynophore, 1-celled with 2 multiovulate placentas or 2-celled owing to the cohesion more or less of the placentas. Stigma sessile. Fruit globose or ovoid with a coriaceous rind. Seeds indefinite, reniform; testa coriaceous; radicle conical, incumbent.—Trees or shrubs. Leaves 3-foliolate. Flowers corymbose, showy.

A small genus, occurring in tropical countries of both hemispheres. But one species occurs in tropical Africa. There are one or two peculiar species in Madagascar.

1. **C. religiosa,** *Forst.; DC. Prod.* i. 243. A tree attaining about 20 ft. Branches glabrous, smooth or slightly verrucose. Leaves 3-foliolate, usually not developed at the time of flowering. Leaflets membranous, acuminate, entire, glabrous, petiolulate, articulated to the petiole, 3–6 in. long; central leaflet elliptical elliptic-lanceolate or oblanceolate, narrowed into the petiolule; lateral leaflets usually obliquely ovate-elliptical or rhomboidal. Flowers polygamous, ¾–1½ in. across, in terminal and lateral many-flowered corymbs. Pedicels ½–2 in.; upper bracts linear or subulate, caducous. Calyx-lobes oblong or ovate-oblong, distinct, rather acute. Petals enlarging after expansion; lamina elliptical or ovate, obtuse, claw equalling the sepals. Ovary ellipsoidal to globose, on a gynophore of 1–2 in., 1-celled or 2-locular at least partially, owing to the cohesion of the placentas. Fruit about the size of an apple, with a coriaceous pericarp on a strong stipes.—*C. Adansonii*, DC., and *C. læta*, DC. Prod. i. 243. *C. guineensis*, Schum. et Thonn. Guin. Pl. 240.

Upper Guinea. Senegal, *Sieber! Heudelot!* Niger, *Barter!*
North Central. Bornou, *E. Vogel! Oudney.*

Nile Land. Madi, *Speke and Grant!* Sennar, *Kotschy! Cienkowski;* White Nile, 12° N. lat., *Dr. Brownell!* Abyssinia and Kordofan (*Schweinf. et Asch. Enum.*).

I do not consider that *C. Roxburghii*, R. Br., of India, is specifically distinguishable from the above. R. Brown pointed out the closeness of their relationship.

11. RITCHIEA, Brown; Benth. et Hook. f. Gen. Pl. i. 110.

Sepals 4, valvate in æstivation. Petals 4 or indefinite, linear-oblong with a long claw, or elongate narrow-linear, wavy. Stamens 12–∞, inserted upon the torus; filaments filiform, free. Ovary oblong or oval, often sulcate, upon a long gynophore, and 1-locular with 2–4 multiovulate placentas or the ovary at least partially divided by the cohesion of the placentary plates. Stigma sessile or subsessile, broad or subpeltate. Fruit (immature) ellipsoidal, obscurely costate, obtusely pointed. Ripe seeds unknown.—Erect or climbing shrubs. Leaves 3–5-foliolate or simple, firmly membranous or subcoriaceous, glabrous. Flowers large, greenish, pedicellate in terminal and lateral corymbs.

A small genus, confined to W. tropical Africa.

I am unable to find any satisfactory ground for referring the numerous 3-foliolate specimens in the Kew herbarium to more than one species. The form and size of the leaflets and sepals, the number of petals, the number of placentas, and the degree to which they cohere, appear to be characters variable in the same gathering.

Leaves simple, oblanceolate or obovate-oblong. Petals numerous . . 1. *R. simplicifolia.*
Leaves 3-foliolate; leaflets elliptical or from obovate- to ovate-elliptical. Petals 4–20 . . . . . 2. *R. fragrans.*
Leaves 5-foliolate (*see note*, p. 101).

1. **R. simplicifolia,** *Oliv.* A shrub of 4–6 ft. Leaves numerous, rather coriaceous, simple, oblanceolate or obovate-oblong, shortly acuminate, narrowed to the petiole, glabrous; midrib and looping lateral veins prominent beneath, 6–8 in. long, 1¾–3 in. broad above the middle; petiole 4–6 lines. Flowers in few-flowered, terminal or axillary, short corymbose fascicles, which are sometimes clustered together; pedicels ¾–1 in. Sepals oblong-elliptical, shortly acuminate; margin tomentose. Petals numerous (about 20), elongate, narrow-linear, about 1 line broad or less. Stamens indefinite, inserted upon a very slightly (½ a line) raised torus. Ovary narrow, oval-oblong, very slightly narrowed to the broad stigma, 1-celled or the placentas partially cohering above.

Upper Guinea. Camaroons river, *Mann!*

2 **R. fragrans,** *Br. in Denh. et Clapp. App.* 20. A shrub, more or less erect or scandent, often attaining 15–20 ft. Branches terete, smooth or verrucose, glabrous. Leaves 3-foliolate or on twining branches sometimes 1-foliolate; leaflets firmly membranous or subcoriaceous, glabrous, shortly petiolulate, articulated to the petiole, elliptical or varying from obovate- to ovate-elliptical, shortly acuminate acute or rather obtuse, often with a slender mucro; median leaflet 4–8 in. long, 1½–3½ in. broad; the lateral leaflets usually rather shorter and more or less oblique. Flowers in short, terminal or axillary corymbs, large, pale yellowish-green. Pedicels ½–3 in. Buds apiculate. Sepals elliptical or oval acute; margin minutely tomentose.

Petals elongate, considerably exceeding the sepals, varying from 4 linear-oval, with a very long claw, to 8 or 20 narrow-linear, wavy, 1–2 lines in breadth. Stamens indefinite. Ovary oval-oblong, usually more or less distinctly 4–8-sulcate, glabrous, 1-celled with 2, 3 or 4 placentas, or with the placentary plates nearly dividing the cavity. Ripe fruit not seen.—*R. erecta*, Hook. f. Fl. Nigrit. 216. tt. 19, 20. *R. polypetala*, Hook. f. Bot. Mag. 5344.

Var. *α*. Petals 4.
Var. *β*. Petals 8–20.
Upper Guinea. Sierra Leone, *Afzelius! Dr. Kirk!* Dahomey, *Burton!* Niger, *Barter!* Accra, *T. Vogel!* Abbeokuta, *Irving!* Fernando Po and Old Calabar, *Mann!*
Lower Guinea. Golungo Alto and Zenza do Golungo, Angola, *Dr. Welwitsch!*

In the original specimen of *R. erecta*, I find 8–9 petals, not 4 only as figured in Fl. Nigritana.

There are two imperfect specimens in the Kew herbarium, with 5-foliolate leaves, one may prove a variety of *R. fragrans*; the leaflets are elongate-oval, acuminate, narrowed to the base, about 8 in. long. It is described as a small erect-growing shrub, with white flowers (Niger, *Barter*). The other is similar to it, but the rather numerous lateral veins are nearly parallel and unite in a distinct undulated intramarginal vein. The flowers are too imperfect for analysis (Sierra d. Crystal, *Mann*).

Order X. MORINGACEÆ (by Prof. Oliver).

Flowers irregular, hermaphrodite. Calyx 5-partite, with a short, cup-shaped tube and unequal, imbricate, at length spreading or reflexed segments. Petals 5, similar in form to the calyx-lobes; 2 upper smaller. Stamens 5, alternating with 5 staminodes or 10, declinate; filaments free, inserted in the margin of the disk; anthers 1-celled, dorsifixed. Ovary 1-celled, stipitate; style terminal, slender; ovules indefinite, anatropous, pendulous, on 3 parietal placentas. Capsule siliquiform, 3–6-angled, 3-valved, many-seeded. Seeds rather large, with or without wings, exalbuminous; radicle superior.—Trees with 2–3-pinnate leaves, clustered at the ends of the branches; leaflets obovate or obovate-oblong, often caducous, or the leaves reduced to the jointed rachis. Panicles ample, hoary or glabrous, of rather large whitish pale yellow or red flowers. Capsules 6–20 in. in length.

A small and anomalous family of doubtful affinity, based upon the single genus of 3 or 4 species, *Moringa*. Confined to India, E. tropical Asia, and warm regions between.

1. MORINGA, Juss.; Benth. et Hook. f. Gen. Pl. i. 430.

Character that of the Order.

Leaflets usually present at flowering. Seeds 3-alate . . . . . 1. *M. pterygosperma.*
Leaves reduced to their jointed, 2–3-pinnate rachis, or leaflets few at flowering. Seeds not winged . . . . . 2. *M. aptera.*

*1. **M. pterygosperma,** *Gærtn.; DC. Prod.* ii. 478. Of this I have seen only a cultivated specimen from Senegambia. It is of Indian origin.

2. **M. aptera,** *Gærtn.; DC. Prod.* ii. 478. Leaves 1 ft. or more in length; with or without a few scattered obovate or oblanceolate leaflets, $\frac{1}{2}$–$\frac{3}{4}$ in. long. Panicles 9 in. to 1 ft., axillary; flowers pale yellow. Capsule about 1 ft. long. Seeds 3-gonous, unappendaged.

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Nile Land. Abyssinia, *Roth!*
Also in Upper Egypt, Syria, and Arabia.

Order XI. RESEDACEÆ (by Prof. Oliver).

Flowers usually hermaphrodite, irregular or nearly regular. Calyx 4–7-partite; segments unequal or nearly equal. Petals 2–4–7 or 0; lamina entire or 3–7-partite, simple or with a dilated claw, free or rarely shortly connate at the base, open in æstivation. Disk sessile or shortly stipitate, often unilateral or 0. Stamens 3–40, inserted on the disk or hypogynous, often declinate, free or the filaments united at the base; anthers 2-celled. Ovary sessile or stipitate, of 2–6 connate carpels, closed or open at the apex or narrowed into short, cuspidate styles. Ovules indefinite, sometimes few, inserted upon parietal placentas, or around the centre and base of the ovary. Fruit a closed or open capsule, or indehiscent, baccate in one genus, or of as many minute follicles as carpels. Seeds indefinite, sometimes few, more or less reniform, exalbuminous; embryo curved or folded with an incumbent radicle.—Annual or perennial herbs or shrubby. Leaves scattered or fasciculate, entire, 3-fid or pinnatifid; stipules minute. Flowers racemose or spicate, bracteate.

A small Natural Order, principally confined to the Mediterranean region and Asia Minor.

Petals 5, of which 2 at least are 5–7-partite; carpels 6, open, connate at the base, shortly stipitate	1. Caylusea.
Petals 4–7, of which at least 2 are 3–10-partite. Ovary 3-lobed at the apex. Fruit an open capsule	2. Reseda.
Petals 2, undivided. Capsule with 4 teeth or cusps	3. Oligomeris.
Petals 0. Fruit a closed berry	4. Ochradenus.

1. CAYLUSEA, St. Hil.; Benth. et Hook. f. Gen. Pl. i. 111.

Calyx 5-partite. Petals 5, of which usually 2 (or 3) have a 5–7-partite lamina; claw obcordate. Stamens 10–14, inserted upon a slightly raised torus. Carpels 6, in a single whorl upon a short gynophore, connate at the base, open above; ovules indefinite, collected in the centre of the carpels. Ripe carpels radiating widely, few-seeded.—Glabrous, setulose-pilose or pilose herbs. Leaves usually entire, lanceolate or linear. Flowers small, in terminal, bracteate racemes.

A genus of two species, both of which are included in the tropical African flora, one being peculiar to Abyssinia. The flowers appear subject to a prolified condition, at least in *C. canescens*.

More or less pilose, hirsute or setulose. Leaves undulate	1. *C. canescens.*
Glabrous or thinly scabrid above. Leaves plane	2. *C. abyssinica.*

1. **C. canescens,** *St. Hil. Mém. Réséd.* (1838) 30. A diffuse or ascending herb, sometimes, in dry situations, with rather rigid, divaricate branches, more or less sparsely hirsute-pilose or very shortly setulose-pilose. Leaves linear-lanceolate or lanceolate, obtuse or acute, usually with a wavy margin, thinly setulose, at least upon the midrib beneath.—For synonymy, see Webb, Spicilegia Gorgonea, 101.

Nile Land. Nubia, *Schweinfurth!*
Extends from the Cape de Verd islands eastward through N. Africa, Egypt, and Arabia, to N.W. India.

2. **C. abyssinica,** *Fisch. et Mey. Ind. Sem.* vii. (1840) 43. An erect, simple or branched herb, of 1–3 ft., glabrous or the branches thinly scabrid towards the elongate, many-flowered, terminal, spike-like racemes. Leaves entire or 3-partite, linear-lanceolate or linear, narrowed to the base and above to the acute or scarcely obtuse apex. Racemes from a few inches to a foot or more in length. Bracts linear-subulate, equalling the pedicel, deciduous. Seeds pale, obsoletely rugulose.—*Reseda abyssinica*, Fresen. in Mus. Senck. ii. 106. *R. pedunculata*, Br. in Salt, Abyss. App. 64. *Astrocarpus abyssinicus*, Hochst. in Pl. Schimp. Abyss.

Nile Land. Abyssinia, *Schimper! Salt! Ferret and Galinier*, etc.

Of the minute membranous petals, 2 have the lamina 5-fid and in 3 it is simple. The obcordate claw appears thinner and more membranous than in *C. canescens*, of which, however, I incline to regard *C. abyssinica* as a variety.

2. RESEDA, Linn.; Benth. et Hook. f. Gen. Pl. i. 112.

Calyx 4–7-partite. Petals hypogynous, 4–7, unequal; the lamina simple linear, or 2–5-partite. Disk unilateral, dilated towards the axis, bearing the stamens. Stamens 10–40. Ovary sessile or shortly stipitate; 3-lobed at the apex; placentas 3–6, multiovulate. Capsule indehiscent, open at the apex; seeds indefinite.—Erect or decumbent, glabrous or pilose herbs. Leaves entire, lobed or pinnatifid. Flowers in terminal, bracteate racemes.

A considerable genus, most numerous in species in countries bordering the Mediterranean and in Western Asia. The following is the only species of which I have seen specimens from tropical Africa, but it is probable others may penetrate within our limits.

1. **R. pruinosa,** *Del. Fl. Ægypt.* 15, *var.* An erect or ascending biennial or perennial herb, 1 to a few feet in height, woody below, with minutely pruinose-puberulous or papillose branches, terminating in long, many-flowered, spicate racemes. Leaves entire or 3-fid, narrow-lanceolate or oval or with linear-lanceolate segments, tapering below into a rather long petiole, above to an acute or subacute point, minutely scabrid-puberulous on the midrib beneath or glabrous. Bracts caducous. Capsules obovate-oblong. Seeds minute reniform, minutely punctate under a lens.—*R. amblyocarpa*, Fresen. in Mus. Senck. ii. 108. *R. Quartiniana*, Rich. Fl. Abyss. i. 13. (*? R. lurida*, Muell. Arg. Mém. Réséd. 152.) For further synonymy see Anderson in Journ. Linn. Soc. v. Suppl. i. 6.

Nile Land. Abyssinia, *Schimper!* and others; Nubia, *Schweinfurth.*

Notwithstanding Dr. Anderson's remarks, I do not think *R. amblyocarpa* can be maintained as specifically distinct from *R. pruinosa*. There is no difference as to the seeds between the Abyssinian and N.W. Indian forms, though in the Aden plant, which was specially under Dr. Anderson's notice, they are very small, black, and rough with minute points. The leaves of our only Abyssinian specimen are entire, though Fresenius describes them as mostly 3-fid. Most of the leaves are 3-fid in the ordinary state of *R. pruinosa*.

3. OLIGOMERIS, Cambess.; Benth. et Hook. f. Gen. Pl. i. 113.

Calyx 4-partite; lobes nearly equal or the two posterior larger. Petals 2, undivided, posterior, free or connate at the base. Stamens 3–8, hypogynous; filaments connate at the base. Disk 0. Ovary sessile, ovoid, tetragonous or 8-sulcate below, abruptly narrowed into the 4 erect, cuspidate, connate

styles; placentas 4, multiovulate. Capsule open at the apex. Seeds indefinite.—Annual or biennial herbs. Leaves entire, linear, fasciculate or scattered. Flowers small, in terminal spikes.

A small genus, of which the following is the most widely-distributed species. Three or four species occur at the Cape.

1. **O. glaucescens,** *Camb. in Jacquem. Voy. Bot.* 24. *t.* 25. An erect or decumbent, glabrous, more or less glaucous herb; the stem sometimes with a few minute scattered setæ above. Leaves fasciculate, narrow-linear, entire. Flowers small, sessile or subsessile, in rather loose, elongate, terminal spikes. Bracts minute, alternating with the two smaller anterior sepals. Stamens 3 (or 2 ?), unilateral. Ovary 8-sulcate below, abruptly narrowed into the 4 erect, connate styles.—*O. subulata*, Webb, Frag. Fl. Æthiop. 26 (*Reseda*, Delile). *O. dispersa*, Muell. Réséd. 214.

Nile Land. Nubia, *Bromfield!*
Occurs in the Atlantic islands, and through Egypt to Persia and N.W. India.
For extended synonymy see Mueller's 'Monographie des Résédacées,' p. 214.

4. **OCHRADENUS,** Delile; Benth. et Hook. f. Gen. Pl. i. 112.

Calyx 5-fid. Petals 0. Stamens 10–20, inserted on an urceolate disk dilated behind. Ovary sessile, ovoid, 3-cuspidate, closed, with 3 ∞-ovulate placentas. Fruit baccate.—Much-branched, glabrous shrubs, with divaricate, virgate, often spinescent, at length leafless branches. Flowers small, spicate.

A small genus, with the following wide-spread species.

1. **O. baccatus,** *Del. Fl. Ægypt.* 15. t. 31. Branches terete, divaricate. Leaves narrow-linear. Berries white.

Nile Land. Abyssinia, *Ehrenberg*; Nubia (*Schweinf. et Asch. Enum.*).

Order XII. VIOLARIEÆ (by Prof. Oliver).

Flowers hermaphrodite, irregular or regular. Sepals 5, equal or unequal, imbricate in æstivation. Petals 5, nearly equal or the lower larger, unguiculate or sessile. Stamens 5, free or monadelphous; anthers erect, 2-celled, with the connective produced beyond the cells (except in *Sauvagesia*, in which staminodia are present outside the fertile stamens). Ovary sessile, 1-celled; placentas usually 3, each with 1–∞ anatropous ovules. Style usually simple, sometimes clavate; stigma terminal or lateral. Fruit a capsule, dehiscing loculicidally (septicidally in *Sauvagesia*), 1–∞-seeded. Seeds with a fleshy albumen and axile embryo.—Herbs shrubs or small trees. Leaves usually alternate, entire, serrate or crenate, stipulate. Flowers axillary or terminal, solitary, fascicled, racemose or panicled, in the woody species small.

A considerable Order, widely distributed in both hemispheres, the woody species affecting the tropics and southern hemisphere.

Staminodia 0. Capsule dehiscing loculicidally.
Lower petal more or less dissimilar.
Sepals gibbous or slightly produced at the base . . . . . 1. Viola.
Sepals not produced at the base . . . . . 2. Ionidium.
Petals subequal. (Shrubs or trees.) . . . . . 3. Alsodeia.
Staminodia of two kinds. Capsule dehiscing septicidally . . . . . 4. Sauvagesia.

1. VIOLA, Linn.; Benth. et Hook. f. Gen. Pl. i. 117.

Sepals nearly equal, gibbous or distinctly produced below the point of insertion. Petals spreading, the lowest spurred or saccate at the base, usually larger or sometimes rather smaller than the rest; anthers nearly sessile, the connective produced into a membranous appendage beyond the cells; two lower stamens usually spurred. Staminodia 0. Style clavate capitate or otherwise dilated, with a terminal or lateral stigma. Capsule dehiscing loculicidally in 3 valves. Seeds ovoid or globose with a crustaceous testa.—Herbs. Stipules usually conspicuous. Peduncles axillary, 1-flowered. Some species bear dimorphic flowers.

A large and very widely diffused genus affecting temperate or mountainous regions in both hemispheres. Many of the species appear connected by intermediate forms which render them difficult of definition.

1. **V. abyssinica,** *Steud. in Pl. Schimp. Abyss.* Flowering stems slender diffuse or elongate, prostrate and rooting at intervals. Leaves cordate or ovate-cordate, usually rather acute, crenulate-serrate, sparsely pubescent or nearly quite glabrous, with or without dark oblong linear or irregular blotches, ½–1 in. long; petioles shorter than or equalling the lamina. Stipules more or less deeply divided into narrow acute segments. Peduncles pubescent or glabrous, exceeding the leaves. Sepals linear-lanceolate, acute, slightly gibbous at the base. Lower petal deeply and obtusely saccate, the spur sometimes equalling the lamina. Style clavate, obliquely triangular above with a lateral stigmatic tooth.—*V. emirnense*, Boj. mss.

Upper Guinea. Fernando Po, 10,000 ft., Camaroons mountain, 7000 ft., *Mann!* (with impunctate leaves).

Nile Land. Abyssinia, in mountainous situations, *Schimper! Roth!*

The same species, as I take it, occurs in Madagascar. *V. abyssinica* may prove a form of some previously described species when the genus comes to be thoroughly worked up. Schweinfurth (Flora v. Soturba) indicates another *Viola* from Nubia, yet undescribed.

2. IONIDIUM, Vent.; Benth. et Hook. f. Gen. Pl. i. 117.

Sepals not produced at the base. Lower petal larger than the rest, clawed, saccate or gibbous at the base. Anthers sessile; filaments short, connective produced beyond the cells as a membranous appendage. Two lower stamens with reflexed spurs (in the African species) from their filaments. Staminodia 0. Style thickened or clavate with the stigma in front. Capsule coriaceous, dehiscing loculicidally and elastically in 3 valves. Seeds oblong or ovoid; testa crustaceous striate or smooth.—Herbs or low shrubs. Leaves usually alternate, entire or toothed, with subulate stipules. Peduncles axillary, solitary in the African species.

A rather numerous genus, principally American. The only tropical African species is widely diffused in the Old World. A few are endemic in Australia and at the Cape.

1. **I. enneaspermum,** *Vent.; DC. Prod.* i. 308. A diffuse decumbent or erect much-branched herb, from a few inches to 2 ft., often woody below or suffrutescent, sometimes erect and simple, glabrous scabrid-pubescent or shortly hirsute-pubescent. Leaves linear or lanceolate, acute, often mucronate, narrowed to the base, remotely serrulate or entire, subsessile or

shortly petiolate, usually 1–3 in. long and varying in breadth from $\frac{1}{12}$–$\frac{1}{2}$ in. Stipules subulate. Flowers blue purple or dull red, axillary, solitary, on filiform pedicels of 1–6 lines, bearing a pair of minute bracteoles near the calyx or above the middle. Sepals lanceolate or linear-lanceolate, acute. Lower petal much exceeding the rest, 3–7 lines long with a distinct claw dilated and saccate at the base; lamina rounded-cuneate or ovate. Two lateral petals rather larger than the two upper, oblique, narrowed to an obtuse apex; upper petals linear-lanceolate, acute. Seeds white or pale, oblong-obovoid, the chalazal end truncate, longitudinally ribbed and usually more or less distinctly transversely striate.—*I. thesiifolium*, DC. Prod. i. 309, and var. *chenopodioides*, Guill. et Perr. Fl. Seneg. 35. . *Viola guineensis*, Schum. et Thonn. Guin. Pl. 133. (*? V. lanceifolia*, Schum. et Thonn. l. c.) *I. rhabdospermum*, Hochst. (*fide* Webb). For extended synonymy, see 'Flora Indica' of Drs. Hooker and Thomson (ined.).

Upper Guinea. Senegal, *Heudelot!* and others; Niger, *T. Vogel! Barter!* etc. Abbeokuta, *Barter!* Guinea, *Thonning.*
Nile Land. Kordofan, *Kotschy!*
Lower Guinea. Loanda, Angola, *Dr. Welwitsch!*
Mozamb. Distr. Zambesi, *Dr. Kirk!*

Var. *hirta* (*I. hirtum*, Klotzsch in Peters' Mossamb. 148). Zambesi, *Dr. Kirk! Peters!* near Simbah, about lat. 5–6° S., *Speke and Grant!*

Occurs also in Madagascar, India, and Australia. A very variable plant in form of leaf, indumentum, and perhaps size and colour of flowers.

3. ALSODEIA, Thouars; Benth. et Hook. f. Gen. Pl. i. 118.

Sepals not produced at the base. Petals nearly or quite equal, exunguiculate or nearly so. Filaments connate, the anthers inserted upon or within the margin of the tube, or free, usually with a conspicuous dorsal or terminal connective produced beyond the cells. Placentas 1–∞-ovulate. Style straight with a terminal stigma. Capsule 3-valved, opening loculicidally, few-seeded. Seeds rounded or angulate, glabrous or cottony.—Shrubs or trees. Leaves usually alternate serrate or crenate (often minutely) or entire. Stipules small. Flowers small axillary or terminal, fasciculate racemose or paniculate, rarely solitary.

A considerable tropical and subtropical genus common to both hemispheres, though none of the New World species have been identified in the Old, nor do any of the African species occur in India. Some of the species are apparently very variable and exceedingly difficult to define, the difficulty increasing as usual with the material. I am uncertain how far I may be right in attributing importance in the diagnoses to the insertion of the anthers.

Flowers in axillary or axillary and terminal fascicles or racemes, rarely solitary.
- Flowers axillary. Stamens free. Dorsal connective narrower than the anther-cells; apex deciduous . . . . . 1. *A. candata.*
- Filaments connate. Dorsal connective as broad or broader than the anther cells.
  - Flowers in axillary racemes or fascicles. Connective ovate, obtuse . . . . . 2. *A. latifolia.*
  - Flowers in lateral and terminal short racemes or fascicles; anthers not exserted; connective elongate-lanceolate, acute . 3. *A. elliptica.*
  - Flowers in loose racemes with spreading pedicels; anthers exserted . . . . . 4. *A. ardisiæflora.*

Flowers in terminal panicles, racemose corymbose or pyramidal.
- Leaves strongly spinulose-serrate, 6–9 in. . . . . 5. *A. ilicifolia.*
- Leaves not spinulose, serrate, crenulate, denticulate or nearly or quite entire. Dorsal connective as broad or broader than the cells of the anther.
  - Leaves 1½–2½ in., slightly cordate at base. Flowers in very small cymulose terminal clusters . . . . . 6. *A. cymulosa.*
  - Leaves 2½–8 in.
    - Staminal tube not produced above the insertion of the anthers.
      - Leaves rarely exceeding 3½–4 in., shortly and obtusely acuminate. Petioles ⅛–½ in. Anterior anther-cells obtuse or emarginate . . . . . 7. *A. Aucuparia.*
      - Leaves 5–8 in., cuspidate or acuminate. Petioles ½–3 in. Anterior anther-cells obtuse or emarginate . . . . 8. *A. brachypetala.*
      - Leaves 2½–5 in. Anterior anther-cells with 2-partite appendix . . . . . 9. *A. subintegrifolia.*
    - Staminal tube more or less produced above the insertion of the anthers.
      - Leaves rounded or subcordate at the base. Petioles ⅛–¼ in. Panicles corymbose. Sepals obtuse . . . . . 10. *A. castaneoides.*
      - Leaves acute or rather obtuse at the base. Petioles ¼ in. or less. Panicles racemose or pyramidal. Sepals rather acute . . . . . 11. *A. dentata.*
      - Leaves not cordate at the base. Petioles ½–2 in. Panicles usually corymbose or pyramidal. Sepals obtuse . . 12. *A. Welwitschii.*

Flowers fasciculate, from nodes on the old wood. Leaves very large (20–30 in. long) . . . . . 13. *A.? cauliflora.*

1. **A. caudata,** *Oliv.* A glabrous shrub or the extremities obsoletely pubescent. Leaves obovate-elliptical or oval, rather abruptly narrowed above into a narrow acumen of about ¾ in.; base cuneate or more or less obtuse or rounded; 4–5 in. long, acumen included, 1–1¾ in. broad; petiole 1½–3 lines. Flowers axillary, solitary, or 2 or 3 together, on bracteate pedicels of 1–3 lines. Petals oblong, about three times as long as the sepals. Stamens free; anthers produced at the apex into a lanceolate, incurved, obtuse, deciduous appendix which, when it falls, exposes the produced acute inflexed tip of the anterior cells. Ovary pubescent, 3-lobed, shorter than the subulate filiform style into which it is narrowed. Fruit deeply 3-lobed, apiculate, coriaceous, reticulated, glabrous, with 1 seed to each placenta.

Upper Guinea. River Kongui, *Mann!*

I have had only imperfect flowers to examine. The stamens appear to be early deciduous, the filaments falling away from a minute persistent 2-lobed pulvinus.

2. **A. latifolia?** *Thouars; DC. Prod.* i. 313. A small tree, extremities minutely pubescent. Leaves rather coriaceous, elliptical or oval, narrowed to each end, shortly and obtusely or acutely acuminate, serrulate from a little above the base or the middle, glabrous, about 3 in. long, 1¼ in. broad; petiole pubescent at first, 1–2 lines. Flowers in very short axillary bracteate racemes or fascicles, on pedicels of 2–3 lines; bracts much shorter than the pedicels. Sepals oblong. Petals linear, rather narrowed below, recurved at the apex. Connective ovate, obtuse, exceeding the 2-fid appendix of the anterior cells. Ovary glabrous, pauciovulate.

Upper Guinea. Sierra Leone, *Barter!*

Very nearly allied to, if not identical with, a plant in the Kew Herbarium, collected in the island of Nissobé (near Madagascar) by Boivin.

I have not seen type-specimens of *A. latifolia*. The Sierra Leone plant resembles Thouars' figure, though it would scarcely rank under his section of *Alsodeia*, "*urceolus cingulatus*."

3. **A. elliptica,** *Oliv.* A glabrous shrub. Leaves elliptical, rather obtuse or emarginate; base obtuse or subcordate, minutely or obsoletely serrulate, glabrous, 2½–3½ in. long, 1¼–2 in. broad; petioles 3–4 lines. Flowers in very short pubescent racemes or axillary fascicles often clustered towards the extremities, about ¼ in. long; pedicels ¼ in. Sepals rotundate, ciliolate. Petals oblong-lanceolate, rather obtuse, 3–4 times as long as the sepals, not at all or but slightly recurved above; connective elongate-lanceolate, acute, much produced beyond the cells. Young capsules globose or ovoid, 1-seeded.

Mozamb. Distr. Rovuma river, 20 miles from the mouth, *Dr. Kirk!*

4. **A. ardisiæflora,** *Welw. mss.* A small slender tree of 8 ft. Extremities pubescent, at length glabrate. Leaves submembranous, rather small, elliptical or ovate-elliptical, often shortly narrowed to the obtuse apex, obtusely serrulate or denticulate-serrate, glabrous above, at first thinly pubescent beneath, 1½–2½ in. long, ¾–1¼ in. broad; petiole pubescent, 1–2 lines. Flowers yellowish-white, in terminal and axillary spreading racemes 1–2 in. long. Pedicels patent or ascending, ½–¼ in. long, articulated near the base. Sepals ovate, obtuse. Petals oval-oblong, obtuse, recurved over the sepals. Anthers exserted, with an ovate-lanceolate rather obtuse apiculate or mucronate connective about twice the length of the anther-cells, sessile and inserted slightly within the pilose-margined staminal tube; anterior-cells unappendaged. Placentas 1-ovulate. Young fruit globose.

Lower Guinea. Angola, prov. Pungo Andongo, *Dr. Welwitsch!*

5. **A. ilicifolia,** *Welw. in Linn. Trans.* xxvii. *t.* 2. (*ined.*). A glabrous shrub or small tree, varying from 1 or 2 ft. to 12 ft. in height. Leaves elongate, oval-oblong or narrowly elliptical, coriaceous, acute, base more or less cuneate or rounded in the broader leaves, coarsely spinose-serrate, midrib prominent beneath, shining above, 6–9 in. long, 1¾–2½ (–3½) in. broad; petiole ½–1¼ in. Flowers yellow, in narrow, terminal, racemose, glabrous or nearly glabrous panicles, 1–6 in. long; lateral branches ascending, mostly very short or the recurved flowers in nearly sessile fascicles of 2 or 3–8. Sepals ovate-elliptical obtuse glabrate. Petals obtuse. Staminal tube (in bud) not produced beyond the insertion of the anthers. Anterior anther-cells with a narrow oval entire or emarginate appendix, shorter than the obtuse dorsal connective. Capsule coriaceous, about ¾ in. long; valves rugulose; seeds 3 5 lines broad.

Lower Guinea. Angola, prov. Pungo Andongo and Ambaca, *Dr. Welwitsch!*
Specimens in bud, apparently of the same species, are in the herbarium of the British Museum, from Sierra Leone, *Afzelius*, and Cape Coast, *Brass.*

6. **A. cymulosa,** *Welw. mss.* A shrub of 2–3 ft., at the time of flowering almost leafless according to Dr. Welwitsch. Extremities puberulous or glabrate. Leaves membranous, oblanceolate or obovate acuminate, base narrowed usually slightly cordate, crenulate-serrate, minutely puberulous

beneath and on the midrib above, glabrescent, 1½–2½ in. long, ½–1¼ in. broad; petiole ½–2 lines. Flowers whitish, more or less recurved, clustered or cymulose in few-flowered panicles shorter than the terminal leaves, usually ½–1 in. long and broad or terminating short lateral branches. Sepals obtuse. Petals ovate-oblong, obtuse, apparently not recurved. Staminal tube very shortly produced above the insertion of the anthers. Connective ovate or ovate-lanceolate, as broad as the cells; appendix of anterior anther-cells linear or oval, entire or 2-partite. Fruit not seen.

Lower Guinea. Angola, prov. Zenza do Golungo, *Dr. Welwitsch!* (? Congo, *Smith!*).

7. **A. Aucuparia,** *Welw. mss.* A shrub of 4–5 ft. or small tree with an erect slender trunk, attaining 8–10 ft. Extremities glabrous. Leaves firmly membranous, rather broadly oblanceolate, shortly and obtusely acuminate or obtuse, glabrous, narrowed to the acute or more or less obtuse but not cordate base, serrulate or nearly entire, 2½–3½ in. long, 1–1¾ in. broad above the middle; petioles 2–6 lines. Flowers greenish-yellow, in small cymulose clusters collected in terminal and lateral racemose panicles ½–2 in. long; lateral branches of the panicles usually not exceeding 3 or 4 lines. Pedicels shorter than or equalling the calyx. Sepals broadly ovate ciliolate. Petals very obtuse, slightly recurved at the apex. Staminal tube very short and not produced above the insertion of the anthers. Anterior anther-cells pilose or glabrous, shortly produced, obtuse or emarginate. Fruit not seen.

Lower Guinea. Angola, prov. Pungo Andongo, *Dr. Welwitsch!*

8. **A. brachypetala,** *Turcz. in Bull. Mosc.* xxxvi. 558. A shrub of 2–4 ft.; the extremities pubescent or glabrate. Leaves obovate obovate-elliptical or broadly oblanceolate, shortly acuminate or cuspidate, cuneate or rather obtuse at the base, broadly crenate crenulate or subentire, glabrous, 5–8 in. long, 2–3(–4) in. broad; petiole very various, ½–1½(–2½) in. Flowers in short terminal racemes, or racemose usually pilose panicles of 1–3 in. Pedicels very short or flowers subsessile, often 3–5 together, on short lateral branches (1–2 lines) of the panicle, usually more or less recurved. Sepals ovate obtuse, pilose or glabrate. Staminal tube apparently not produced above the insertion of the anthers. Connective broad ovate obtuse; anterior cells scarcely or but shortly produced, minutely 2-fid or entire.

Upper Guinea. Gaboon, *Mann!*
Lower Guinea. Congo, *C. Smith! Burton!* Angola, prov. Golungo Alto, *Dr. Welwitsch!*

9. **A. subintegrifolia?** *P. de Beauv. Fl. d'Owar.* ii. 11. *t.* 66 (*Ceranthera*). A glabrous shrub or the extremities minutely pubescent. Leaves broadly oval, ovate-lanceolate or oblanceolate, shortly and obtusely acuminate, remotely dentate or nearly entire, cuneate or rounded at the base, 2½–5 in. long, 1–2 in. broad; petioles varying up to ½–¾ in., often much shorter. Flowers yellow, in small terminal pyramidal panicles about 1 in. long more or less, on short more or less recurved pedicels. Sepals ovate obtuse. Filaments inserted upon the inner edge of the thickened margin of the crenulate sta-

minal tube. Connective exceeding the 2-partite tip of the anterior anther-cells.

Upper Guinea. Oware, *Beauvois;* Old Calabar, *Rev. W. C. Thomson!*

This plant nearly corresponds with a specimen labelled "*A. arborea*, P. Th.?," in the Thouarsian herbarium at the Jardin des Plantes. Excepting in the smaller flowers, more ovate petals, and staminal tube not produced above the insertion of the filaments, it is very near to *A. dentata.*

10. **A. castaneoides,** *Welw. mss.* A robust shrub, attaining 6–8 ft.; the extremities shortly pilose or pubescent with spreading hairs. Leaves obovate- or oblanceolate-oblong, cuspidate or shortly acuminate, narrowed to the rounded obtuse or subcordate base, dentate-serrate especially above the middle, glabrescent above, the midrib distinctly pubescent at first, softly but very shortly pubescent beneath, usually 5–8 in. long, 2–2¾ in. broad above the middle; petioles from 2–3 lines to an inch or more. Flowers yellowish, in terminal corymbose or pyramidal panicles, 3–5 in. long and broad; the lower branches longest. Pedicels shorter than or scarcely exceeding the calyx. Sepals ovate obtuse. Petals ovate-oblong, obtuse, plane or slightly recurved towards the apex. Staminal tube very shortly produced above the insertion of the anthers. Appendix of anterior anther-cells entire or 2-fid. Ovary slightly pubescent. Young fruit globose, glabrous; the style long-persisting.

Lower Guinea. Angola, prov. Pungo Andongo, *Dr. Welwitsch!* river Kongui, *Mann!* (a form with glabrate nearly entire leaves and small panicles).

Var.? *strictiflora*, a shrub of 4 ft., with strict glabrescent branches; flowers smaller, white, in short, erect, terminal and axillary, cymose panicles.

Lower Guinea. Angola, prov. Cazengo, *Dr. Welwitsch!*

This may prove a distinct species, but our material does not suffice to determine.

11. **A. dentata,** *P. de Beauv. Fl. d'Owar.* ii. 11. *t.* 65 (*Ceranthera*). A shrub from 3–4 to 10–15 ft. in height; the extremities glabrous or minutely puberulous. Leaves membranous, obovate-oblong or -elliptical, acute or acuminate, base acute, cuneate or rather obtuse, more or less crenate-serrate or serrulate, glabrous above, nerves beneath shortly pilose or glabrate; 4–8 (3–9) in. long, 2–3 in. broad; petioles ¼–½ in. or shorter. Flowers whitish or sulphur-yellow, recurved or subpendulous, in terminal racemose or pyramidal panicles shorter than or exceeding the leaves, usually from 2–4 in. long. Lower branches of the panicle ascending, short or elongate. Pedicels shorter than or equalling the calyx. Sepals oblong-ovate, rather acute. Staminal tube produced above the insertion of the anthers. Connective ovate, obtuse. Anterior anther-cells with a 2-partite tip. Valves of the fruit pointed, with a horny endocarp. Seeds 2–3 lines long and broad, smooth.

Upper Guinea. Oware, *Beauvois;* Fernando Po, *Mann!* Prince's Island, *Barter!*
Lower Guinea. Angola, prov. Cazengo and Golungo Alto, *Dr. Welwitsch!*

Perhaps this ought to include also *A. subintegrifolia.*

12. **A. Welwitschii,** *Oliv.* A shrub or small tree, from 8–20 ft. in height. Extremities glabrous or pubescent. Leaves oblanceolate or obovate-oblong, cuspidate or shortly acuminate, acute or obtuse at the base or in the

broad-leaved forms sometimes rounded, serrulate above or subentire, glabrous or minutely pubescent on the midrib beneath, with or without minute black dots on the under surface, 4–8 in. long, 1½–3 in. broad; petiole various, usually from ¾–2 in., occasionally only ¼ in. Flowers yellow or orange-yellow, in terminal many-flowered panicles usually corymbose or pyramidal. Sepals pilose or glabrous, obtuse. Staminal tube more or less produced above the insertion of the anthers. Anterior anther-cells with a 2-partite or emarginate tip. Fruit not seen.

Upper Guinea. Camaroons river, *Mann!* Old Calabar, *Rev. W. C. Thomson!* Senegambia!

Lower Guinea. Angola, prov. Golungo Alto, *Dr. Welwitsch!*

Perhaps to this species belong specimens brought by Mr. Mann from the Gaboon, which have the tips of the anterior anther-cells less distinctly produced and obtuse or emarginate.

13. **A.? cauliflora,** *Oliv.* A small tree. Leaves very large, rather coriaceous, broadly oblanceolate or obovate, much and gradually narrowed to the base, shortly acuminate, remotely serrulate above, glabrous, the strong midrib and lateral nerves prominent beneath; 20–30 in. long, 6–9 in. broad above the middle, 2–3 in. broad at 6 in. from the base, nearly sessile or upon very short thick petioles. Stipules 2–3 lines, triangular-subulate, at length removed a short distance from the petioles. Flowers fasciculate from nodes on the old wood, on glabrous pedicels of about 2 lines. Sepals ovate obtuse. Petals spreading above, oblong-lanceolate, obtuse, slightly connate at the base. Anthers closely connivent around the ovary, subsessile; connective lanceolate acute or rather obtuse, exceeding the long subulate tips of the anterior cells. Style elongate. Ovules about 3. Fruit not seen.

Upper Guinea. Gaboon river, *Mann!*

A remarkably fine plant, and in habit very unlike an *Alsodeia*. Excepting in the slight connation of the petals, it agrees with that genus as to the flowers. The fruit, however, may prove it generically distinct.

4. **SAUVAGESIA,** Linn.; Benth. et Hook. f. Gen. Pl. i. 120.

Sepals not produced at the base. Petals equal, contorted in æstivation. Fertile stamens 5; filaments very short; anthers linear, unappendaged. Staminodia in 2 series; the 5 inner petaloid, oblong, nearly equalling the stamens; the outer of ∞, capitate hairs, much shorter than the stamens. Placentas 3; style filiform; stigma simple, obtuse. Capsule 3-valved, opening septicidally. Seeds numerous, pitted.—Herbs or wiry undershrubs. Leaves alternate, rather rigid, entire or serrulate, glabrous. Stipules pectinate-fimbriate. Flowers rather small, axillary, solitary, geminate or fascicled, pedicellate in the African species, white rose or violet.

A small American genus, of which the following species is the only one common to both hemispheres. It appears to be common in W. tropical Africa.

1. **S. erecta,** *Linn.; DC. Prod.* i. 315. A low, ascending decumbent or erect herb. Leaves lanceolate or narrowly elliptical, serrulate, with prominent veins, usually ½–1 in. long. Pedicels slender, spreading-decurved, equalling or exceeding the leaves.

Upper Guinea. In wet places, Senegambia! Niger, *T. Vogel and Barter!* Bagroo, *Mann!*

Order XIII. BIXINEÆ (by Prof. Oliver).

Flowers regular, hermaphrodite or 1-sexual. Sepals 3–8, free or united below, imbricate or rarely subvalvate in æstivation. Petals as many as the sepals or numerous or wanting, imbricate or contorted. Stamens hypogynous, indefinite; anthers 2-locular, dehiscing longitudinally or by terminal slits. Torus with or without a thickened disk. Ovary free, 1-celled or with the walls intruded so as to be spuriously multilocular; placentas usually 2–∞, with many or few, more or less anatropous ovules. Fruit capsular or baccate, separating into as many valves as placentas or indehiscent. Seeds few or many, usually with fleshy albumen, and an axile embryo with broad cotyledons.—Trees or shrubs, sometimes armed with axillary spines. Leaves alternate, simple. Stipules minute or 0. Flowers axillary or terminal or from the old wood, solitary, fascicled, racemose or panicled, in some of the petaloid genera large and showy; in the dicœcious genera insignificant.

Bixineæ are chiefly confined to the tropics. Of the following seven genera, two are endemic; *Bixa* is not indigenous, *Cochlospermum* extends to S. America and Australia, *Flacourtia* is also Indian, and *Oncoba*, as here limited, embraces some S. American species. There are four other genera of the Order peculiar to south extratropical Africa, and one to Madagascar and the islands of the Indian Ocean.

Flowers hermaphrodite, ample. Petals unappendaged. Anthers dehiscing by terminal slits or pores.
- Anthers straight, dehiscing by apical slits. Endocarp separable . 1. Cochlospermum.
- Anthers folded back upon themselves, dehiscing by transverse slits at the apical fold . . . . . 2. Bixa.

Flowers hermaphrodite or 1-sexual. Petals present. Anthers dehiscing longitudinally.
- Petals 5–∞, unappendaged . . . . . 3. Oncoba.
- Petals 4–7, with hairy adnate scale within . . . . . 7. Dasylepis.

Flowers hermaphrodite. Petals 0 . . . . . 4. Ludia.

Flowers dicœcious. Petals 0.
- Calyx-lobes imbricate . . . . . 5. Flacourtia.
- Calyx-lobes scarcely imbricate. Seeds more or less hairy . . 6. Aberia.

1. COCHLOSPERMUM, Kunth; Benth. et Hook. f. Gen. Pl. i. 124.

Flowers hermaphrodite. Calyx of 5 unequal, imbricate sepals. Petals 5, large, contorted-imbricate in æstivation. Stamens indefinite, free, with oblong or linear anthers, opening by a short pore-like slit at the apex, on the inner face. Ovary 1-celled, with 3–5 projecting, multiovulate placentas. Style undivided, slender. Stigma simple, obtuse or minutely toothed. Capsule somewhat papery, separating into 3–5 valves when ripe, each valve alternating with a corresponding valve of the submembranous endocarp. Seeds numerous, reniform or spirally twisted, covered or fringed with long, cottony hairs; testa horny; embryo curved.—Shrubs or trees, affording a yellow dye. Leaves alternate, palmately-lobed in the African species. Flowers showy, yellow, pedicellate, fascicled, racemose or panicled, either terminal or from the upper axils or from the old wood of the stock.

A genus of 10–12 species, growing in tropical and subtropical countries both of the Old and New World.

Leaves not divided more than halfway to the base, paler and uniformly pubescent beneath; segments not overlapping at the base . . . . 1. *C. tinctorium*.

Leaves divided more than halfway to the base, central lobe more or less narrowed below; more or less pubescent beneath; segments divergent, not overlapping at the base . . . . . 2. *C. niloticum.*
Leaves glabrous, divided more than halfway (three-fourths or more) to the base; segments usually more or less overlapping at the base . . 3. *C. angolense.*

1. **C. tinctorium,** *Rich. in Fl. Seneg.* 99. *t.* 21. A small tree or shrub, 5–6 ft. high, with numerous puberulent leafy shoots, usually given off from a low stock. Leaves petiolate, palminerved, of roundish outline, with a cordate base, 5- or 3-lobed, pubescent and paler beneath, at length glabrescent and shining above; lobes rounded or ovate-oblong, obtuse or acute, serrulate or obsoletely sinuate-dentate. Leaves 2½–3½ in. long, 3–5 in. broad; petioles ¾–2 in. long. Flowers 1 to nearly 4 in. diam. Bracts scale-like, linear, 1–3 lines long.—*C. Planchoni*, Hook. f. Fl. Nigrit. 268.

Upper Guinea. Quorra, "very common on a rocky soil," *Barter! T. Vogel!* Niger, *Dr. Baikie!* Near Niaral, in the Province of Cayor and N'Denout in N'Boro, Senegambia (Richard).

Nile Land. (*Schweinf. and Asch. Enum.*)

2. **C. niloticum,** *Oliv.* Shoots at length glabrous. Leaves soon glabrous above, divided nearly to the base (three-fourths or more) into 3 or 5 linear-oblong segments, the central lobe slightly narrowed to its base, or obovate-oblong, obtuse or scarcely acute. Leaves, in the Kew specimen, 1–1½ in. long, 2–2½ in. broad. Petioles about ½ inch. Sepals nearly or quite glabrous. Flowers and inflorescence as in *C. tinctorium.*

Nile Land. Madi, *Speke and Grant!*

The plant referred to *C. tinctorium* by Drs. Schweinfurth and Ascherson may be the same.

3. **C. angolense,** *Welw. mss.* A tree, attaining a height of 10–20 ft., with a trunk about 9 in. diam. at the base. Branches divaricate. Leaves rather coriaceous, deeply divided (three-fourths or more) into 5 lanceolate or oblong-lanceolate, acuminate segments, serrulate above or nearly entire; glabrous on both surfaces or the nerves obsoletely pubescent beneath; the segments usually slightly overlap each other at the base. Larger leaves 6–7 in. broad, 3½–4 in. long, central lobe about 1¼–1¾ in. broad; petiole 2–4 in. long. Flowers few together (about 3), 3–4 in. diam., deep yellow. Pedicels puberulous, 1 in. long. Sepals nearly or quite glabrous. Anthers dehiscing by a single minute terminal slit. Ovary densely and softly villous. Fruit about 3 in. long and 2 in. diam., broadly ellipsoidal or obovoid, depressed at the top, separating when ripe into 4 thin, coriaceous, striate, puberulous valves. Seeds reniform, black and shining, enveloped in a deciduous cotton.

Lower Guinea. Angola, distr. Golungo Alto. Frequent on dry, stony declivities between Sange and Camilungo; flowering in February and March, *Dr. Welwitsch!*

The Borotuto of the natives, who use the bark in fabricating a coarse cordage. This species is very closely allied to *C. Gillivræi*, Benth., growing in Queensland, Australia, differing in the villous ovary and some minor characters.

2. BIXA, Linn.; Benth. et Hook. f. Gen. Pl. i. 125.

Flowers hermaphrodite. Sepals 5, much imbricated, deciduous. Petals 5, large, imbricate. Stamens indefinite, with short, oblong, somewhat tetragonous anthers, dehiscing by 2 pore-like, transverse slits at the top (really

linear anthers, folded back upon themselves, dehiscing only in the middle of each lobe). Ovary 1-celled, with 2 or rarely 3 multiovulate placentas. Style slender; stigma minutely 2-lobed. Capsule coriaceous, compressed-ovoid or subcordate, rarely 3-gonous, rough with long, stiff bristles, separating into 2 (or 3) valves, bearing the seeds covered with a red pulp.—A shrub, with alternate, ovate, somewhat palminerved leaves and terminal panicles or paniculate racemes of large rose or white flowers.

A genus of 1, or perhaps 2 species, native in tropical America. The following is cultivated or naturalized very widely between the tropics of the Old World. The red pulpy covering of the seeds is used as a dye, under the name of Arnatto.

*1. **B. Orellana,** *Linn.; DC. Prod.* i. 259. A small tree of about 10 (5–15) ft., the young shoots and inflorescence rusty-puberulous. Leaves ovate or subcordate-ovate, acuminate or acute, entire, rarely with 1 or 2 unequal lateral lobes, palminerved at the base, usually 4–6 in. long, 2½–3½ in. broad, glabrous or glabrescent. Flowers 1½–2 in. diam. Fruit 1½–2 in. long, 1¼ in. broad, rather pointed.

Upper Guinea. About towns on the Niger, *Barter!* (not much used by the natives); Fernando Po and Prince's Island, *Mann!*

Lower Guinea. Angola, occurring as though indigenous in woods and thickets, *Dr. Welwitsch!*

Dr. Welwitsch found growing sporadically in elevated woods in the district of Golungo Alto in Angola, a small-leaved form, the leaves sometimes lobed, ovate, acuminate, 2–4 in. long, and 1–2 in. broad.

3. ONCOBA, Forsk.; Benth. et Hook. f. Gen. Pl. i. 125.

(Heptaca, *Lour.*; Ventenatia, *P. de Beauv.*; Xylotheca, *Hochst.*; Chlanis, *Klotzsch*; Mayna, *Aubl.*)

Flowers polygamous. Sepals 3 or 4, free or cohering below, imbricate. Petals 5–10 or more, rarely fewer, often narrowed toward the base and exceeding the sepals, imbricate. Stamens indefinite, free; anthers linear, rarely shortly oblong, dehiscing longitudinally, with or without a terminal point or awn. Ovary 1-celled, with 2–10 multiovulate placentas. Style simple; stigma various, either denticulate or divided into as many linear or subulate or capitate, ascending or radiate lobes as placentas, or peltate and depressed in the centre. Fruit dehiscent or indehiscent, smooth, ridged, furrowed or echinate, coriaceous or shell-like, 1-celled, many-seeded or in some small-flowered species, few- or 1-seeded. Seeds with a horny testa; embryo with leafy cotyledons.—Trees or shrubs, sometimes spinose. Leaves alternate, usually penninerved, coriaceous or membranous. Flowers terminal or axillary, solitary, fascicled or racemose, white reddish-white or yellowish; in several species large and showy.

A genus of about 20 or 22 described species, confined to the tropical and subtropical parts of Africa and America. The American species are small-flowered, with echinate fruits, and have hitherto been held as generically distinct from *Oncoba*. Some of the new species here described unite the extremes. (See Oliver in Journ. Linn. Soc. ix. 172.)

Flowers terminal or axillary, solitary or in fascicles, not racemose.

Flowers 1–4 in. diam. Fruit various.

Leaves pubescent, entire or undulate. Petioles short, rarely more than 1 in. Flowers usually solitary or two or three together.

Leaves obovate or oblong, rounded at the apex. Stigma-lobes subulate. Fruit circular in section . . . . . 3. *O. Petersiana.*
Leaves obovate or oblong. Stigma-lobes minute, spreading. Fruit longitudinally furrowed . . . . . 4. *O. Tettensis.*
Leaves lanceolate or oblanceolate. Stigma obtuse, nearly or quite undivided . . . . . 6. *O. Kraussiana.*
Leaves more or less pubescent or hairy at first, crenate-serrate, petioles short. Flowers solitary. Stigma-lobes radiate, singly capitate. (Usually with short, slightly curved spines.) 2. *O. brachyanthera.*
Leaves glabrous.
Leaves obovate, shortly petiolate. Fruit ovoid-globose, pointed . . . . . 5. *O. Kirkii.*
Leaves elliptical, oval or lanceolate. Stigma peltate, entire or lobed. Fruit globose. (Usually with slender, axillary spines.) . . . . . 1. *O. spinosa.*
Leaves lanceolate or oblanceolate; petioles short. Stigma obtuse. Flower usually solitary . . . . . 6. *O. Kraussiana.*
Leaves oval or elliptical; petioles 1 in. or more. Flowers 3–4 in. diam. Stigma obtuse, scarcely lobed. Fruit globose, usually more or less pointed or cuspidate . . . 7. *O. glauca.*
Leaves large, membranous, ovate, acuminate; petioles 3–5 in. Flowers large, in lateral fascicles. Stigma-lobes radiate, linear. Fruit echinate . . . . . 8. *O. Welwitschii.*
Leaves oval-oblong. Flowers in lateral fascicles on straight, erect pedunceles. Stigma obtuse, undivided or minutely lobed. Fruit with wavy ridges . . . . . 10. *O. lophocarpa.*
Flowers small, less than 1 in. diam. Fruit echinate . . . . 13. *O. echinata.*
Flowers in axillary or extra-axillary racemes.
Leaves entire or undulate.
Flowers about 1½ in. diam. Pedicels 4–8 lines. Anthers very shortly pointed. Stigma-lobes 4–5, linear, radiate . . . 9. *O. Mannii.*
Flowers ½ in. or less in diam. Pedicels 1–2 lines. Anthers very shortly pointed. Stigma-lobes radiate, obtuse. Fruit furrowed . . . . . 11. *O. ovalis.*
Flowers about ½ in. diam., in extra-axillary racemes, shorter than petioles. Anthers aristate . . . . . 12. *O. aristata.*
Leaves dentate-serrate, membranous. Flowers in loose or interrupted axillary racemes. Stigma minute. Fruit small, echinate. 14. *O. dentata.*

1. **O. spinosa,** *Forsk.; Rich. in Fl. Seneg.* 32. *t.* 10. A glabrous shrub, usually armed with slender, spreading, very acute, axillary spines, sometimes 2 in. long or more. Young twigs marked with numerous, minute, pale, lenticel-spots. Leaves membranous or rather coriaceous, shortly petiolate, elliptical, generally shortly acuminate, serrulate or crenate-serrate (sometimes obsoletely) from a little above the wedge-shaped or rounded base, 2–3½ in. long, 1¼–2 in. broad. Flowers showy, white, fragrant, about 2 in. across, terminal or lateral, upon short, axillary shoots. Calyx deeply 4-fid, usually persisting, about half as long as the petals, which appear to be variable in number. Anthers linear, much shorter than the slender filaments, with a minute, acute, triangular tip beyond the cells. Fruit globose, 1½–2 in. diam. or sometimes more, smooth, with a hard shell, marked with several equidistant, scarcely prominent, longitudinal lines; applied to ornamental and other uses by the natives. — *Lundia monacantha,* Schum. et Thonn. Guin. Pl. 231. *Oncoba monacantha,* Steud. Nom. Bot.

Upper Guinea. Senegambia (*Schumacher and Thonning*); Cape Verde, (*Richard*); Sierra Leone, *Dr. Kirk!* Abbeokuta, and Nupe, Niger, *Barter!*

Nile Land. Abyssinia (*Schweinf. and Asch. Enum.*).
Mozamb. Distr. Shire river, Zambesia, *Dr. Kirk!*
Var. *β. angolensis*, margin of the stigma divided into several lobes capitate or thickened at the extremity; Angola, distr. Golungo Alto and Bumbo, not infrequent, *Dr. Welwitsch!*, who describes the flower as very fragrant. The fruit is edible.
Also in Arabia, and at Natal, *Harvey*, Thes. Cap. 142.

2. **O. brachyanthera,** *Oliv.* Shrub, with the young shoots and leaves more or less hairy, armed with short, slightly curved spines. Bark minutely warted with pale lenticels. Leaves rather coriaceous, more or less elliptical, sometimes ovate or obovate, shortly acuminate, crenate-serrate, shortly stalked, 2–3 in. long, 1¼–1¾ in. broad; secondary nerves prominent on the under side of the older leaves, which become at length nearly or quite glabrous. Flowers about 2 in. across, terminal or upon short lateral shoots. Calyx at length falling away. Anthers oblong, very short, not more than twice as long as broad, cordate-based, obtuse, without a tip. Stigma with about 6 radiate, broadly capitate, distinct lobes. Fruit globose, about 1½–2 in. diam., smooth with a hard shell.

Upper Guinea. Found on the site of an old town on the river Bagroo, *Mann!*

3. **O. Petersiana,** *Oliv.* A softly pubescent shrub, with membranous obovate or obovate-oblong leaves, rounded or very obtuse at the extremity, slightly undulate, more or less pubescent on both sides, 3–4½ in. long, 1¼–2 in. broad. Peduncles terminal or axillary, sometimes leafy, ½ in. to 2 in. long. Flowers about 1½–2 in. diam. Calyx deciduous. Anthers linear. Ovary hairy. Lobes of the stigma about 6, subulate, ascending or slightly recurved. Fruit ovoid or ellipsoidal, obscurely ridged and furrowed or nearly terete, shortly cuspidate, shortly pubescent-tomentose, at length rather scabrous and glabrescent, separating into numerous narrow valves when ripe.—*Chlanis macrophylla*, Klotzsch in Peters' Mossamb. Bot. i. 145.

Mozamb. Distr. Shupanga, Zambesi, *Dr. Kirk! Peters!* also at Delagoa Bay.
Klotzsch's specific name I cannot adopt under *Oncoba*, since numerous species have much larger leaves.

4. **O. Tettensis,** *Oliv.* A pubescent shrub, with obovate or oblong, obtuse, rather coriaceous, shortly-stalked, undulate leaves, 1½–2 in. long, but scarcely fully grown in the specimen seen. Peduncles usually axillary, spreading or ascending, about ¾–1¼ in. long. Flowers 1–1½ in. across. Calyx 3-partite; lobes at length deciduous. Anthers linear. Lobes of the stigma minute, triangular-subulate, slightly spreading or recurved. Fruit ovoid-globose, with a sharp cuspidate point, shortly tomentose, with numerous rather deep longitudinal furrows.—*Chlanis Tettensis*, Klotzsch, l. c.

This species is united with the preceding, by Dr. Hooker, in Harvey and Sonder's 'Flora Capensis,' ii. 584, and perhaps rightly.
Mozamb. Distr. Tete and Shupanga, Zambesi, *Dr. Kirk! Dr. Peters!*
Although I have had the opportunity of comparing our specimens with those named by Klotzsch in the Berlin Herbarium, I cannot be quite sure that I have rightly referred Dr. Kirk's plants, which alone show the two forms of fruit well grown.

5. **O. Kirkii,** *Oliv.* A glabrous shrub, with obovate, obtuse or shortly

cuspidate, rather coriaceous leaves, somewhat shining above, 3 to nearly 6 in. long, 1½–3 in. broad above the middle; petioles 2 lines to 1 in. long. Flowers about 1½ in. diam., on short lateral peduncles. Anthers linear. Fruit ovoid, terete, glabrous, slightly rough, shortly pointed.

Perhaps a variety of *O. Petersiana*.
Mozamb. Distr. Rovuma Bay, lat. 10° S., *Dr. Kirk!*

*6. **O. Kraussiana,** *Planch. in Harv. and Sond. Fl. Cap.* i. 66. Shrub or small tree, 10–15 ft. high, with young leaves and shoots slightly pubescent. Leaves petiolate, firmly membranous, oblanceolate, obtuse or rather acute, glabrescent, 2–2½ in. long, ¾–1 in. broad. Peduncles axillary, 1½–2 in. Flowers solitary or 2 or 3 together, about 2 in. diam. Calyx 3-lobed, pubescent. Anthers linear. Stigma obtuse, scarcely divided. I have not seen the fruit.—Harvey, Thes. Cap. t. 141.

Natal!
Likely to occur north of the tropic.

7. **O. glauca,** *Hook. f. Fl. Nigrit.* 220. A glabrous tree or shrub, with oval or elliptical, entire or slightly undulate, firmly membranous, acuminate leaves, glaucous above, 3–6 in. long, 1½ 3 in. broad. Petals 1–2½ in. Flowers very large, white and showy, 3–4 in. diam., on axillary peduncles about 2 in. long, usually clustered towards the extremities of the branches. Calyx glabrous, 3-lobed, deciduous; lobes rounded. Petals about 12, 2–3 times longer than the sepals. Anthers linear. Style rather long. Stigma obtuse, denticulate. Fruit ovoid or nearly globose, about the size of a hen's egg, smooth, marked with longitudinal grooves when dry.—P. de Beauv. Fl. Ow. et Ben. 30. t. 17 (the colour of the flower and cross section of the ovary are purely imaginary).

Upper Guinea. Lagos, *Barter!* Ambas Bay, *Mann!* Fernando Po, *T. Vogel and Mann!*

8. **O. Welwitschii,** *Oliv.* A small tree or shrub of 12–15 ft., with numerous long, glabrescent or puberulous branches, bearing large, ovate, acuminate, slightly undulate, membranous leaves, 6–9 in. long, 3–7 in. broad, with broadly rounded, almost truncate bases, clustered towards the extremities. Petioles 3–5 in. long. Flowers large, reddish-white or yellow, 3–4 in. diam., in lateral fascicles of 2 to 5 from the axils of fallen leaves on the shoots of a previous year. Stipules subulate-aristate, ½–1 in. long. Peduncles ¾–1 in. Calyx 3-partite. Petals about 10, dilated above, about twice as long as the sepals. Anthers linear, much shorter than the capillary filaments. Ovary rough, with about 5–6 placentas and as many radiating, linear, stigmatic lobes at first obtuse or capitate, terminating the long slender style. Fruit densely echinate with long rather weak spines, separating when ripe into as many more or less recurved valves as there are placentas. The style and stigmas harden and persist a considerable time.—Linn. Trans. xxvii. (incd.) t. 3.

Lower Guinea. Angola, distr. Golungo Alto, flowering in February, *Dr. Welwitsch!*

9. **O. Mannii,** *Oliv.* A glabrous tree, 25 to 50 ft. high, with large,

oblong-elliptical or oblong-obovate, shortly cuspidate, entire or slightly undulate leaves, 6–12 in. long, 2½–5½ in. broad. Petioles 1–2 in., slightly curved near the blade. Flowers about 1½ in. diam., in interrupted racemes 3–6 in. long, from the axils of the upper leaves; pedicels 4–8 lines, articulated at the base, in fascicles of 2, 3 or more or single, scattered along the raceme. Sepals 3. Anthers linear, shortly apiculate, with slightly interrupted cells. Ovary glabrous. Stigma radiate, with about 4 spreading or recurved linear lobes. Fruit not seen.

Upper Guinea. Ambas Bay; Old Calabar river; Fernando Po, *Mann!*

10. **O. lophocarpa,** *Oliv.* A glabrous tree, 30–40 ft. high. Leaves oval-oblong, sometimes lanceolate-elliptical, shortly acuminate, finely membranous, entire or faintly undulate, 4–7 in. long, 1¾–3 in. broad; curved secondary nerves rather prominent below. Petioles ⅓–1¼ in. long. Flowers usually from the axils of fallen leaves on shoots of the previous season, solitary or in fascicles of 2, 3 or more, on erect, firm, straight peduncles, 1½–2½ in. long, about 1¾–2¼ in. diam. Sepals 3, deciduous. Petals numerous, half as long again as the sepals. Anthers linear, without a terminal appendage. Ovary glabrous, soon showing numerous longitudinal furrows, which in the young lanceolate-oblong fruit (which only I have seen) are bounded by strongly-marked, much crisped or wavy ridges, confluent in pairs below and above. Style rigid; stigma obtuse, undivided or denticulate, the extremity apparently more or less resolved at length into a minute viscous or semifluid drop. The fruit narrows at the top to an obtuse point.

Upper Guinea. Camaroons mountain, 2–3000 ft., *Mann!*

11. **O. ovalis,** *Oliv.* A glabrous tree of 20–30 ft., with entire or slightly undulate, elliptical or oblong-elliptical, shortly, abruptly, and obtusely acuminate, firmly membranous or rather coriaceous leaves, 4–6 in. long, 1¾–3 in. broad. Petiole ¾–1 in. Flowers about 4–5 lines in diam., in axillary, rather slender racemes, about 3 in. long, on short pedicels of 1–2 lines. Anthers very shortly pointed. Ovary longitudinally furrowed, tapering into the style. Stigma with 4 5 radiate, recurved, obtuse lobes. Fruit smooth, lanceolate-oval, 2½–3 in. long, tapering at the top and marked with 4 or 5 strong; equidistant, longitudinal furrows with raised margins.

Upper Guinea. Camaroons mountain, 4000 ft., *Mann!*

12. **O. aristata,** *Oliv.* A small glabrous tree. Leaves 9–12 in. long, 4 5 in. broad, oblong-elliptical or obovate-elliptical, wedge-shaped at base; apex with an abrupt narrow acumen, ½ 1 in. long. Midrib and secondary nerves prominent beneath. Petioles 3 4 in. long, slightly thickened and curved at the top. Male flowers about ½ in. diam., shortly pedicellate, in slender extra-axillary racemes about 2 in. long. Sepals 3. Petals 7–8. Anthers minutely pubescent, terminating in an awn half as long to nearly as long as the cells. Pistillate flowers and fruit unknown.

Upper Guinea. River Gaboon, *Mann!*

13. **O. echinata,** *Oliv.* A glabrous shrub. Leaves thinly coriaceous,

oval-oblong or obovate-oblong, rounded or wedge-shaped at base, shortly acuminate, with rather distant secondary nerves, 4–6 in. long, 1½–2½ in. broad. Petiole 3 6 lines. Flowers 3–6 lines in diam. from the branch a little below the leaves, solitary or in fascicles of 2 or 3 on very short peduncles. Anthers linear, without a terminal appendage. Pistillate or hermaphrodite flowers unknown. Fruit on a very short spreading or recurved peduncle, globose, densely echinate, with numerous seeds, about 1 in. diam. exclusive of the spines.

Upper Guinea. Bagroo river, *Mann!*

14. **O. (Mayna) dentata,** *Oliv.* A shrub or small tree, 6–30 ft. high, glabrous or with the young shoots and nerves of the young leaves obsoletely pubescent. Leaves membranous, elliptical or oblong-elliptical, dentate-serrate, especially towards the shortly acuminate extremity, 3–10 in. long, 2–5 in. broad. Petiole 1½–7 in. long, often slightly curved near the top. Stipules subulate, 2–3 lines long, deciduous. Flowers about ½–¾ in. diam., in loose or interrupted, ascending, axillary racemes, 1–3 in. long. Pedicels slender, 1 6 lines long or flowers subsessile. Sepals 3. Petals 6–10. Anthers muticous; cells often multilocellate. Style subulate, with a minute, almost or quite undivided stigma. Ovary hairy, soon echinate with spreading acute spines. Placentas 2 (or 3), with numerous ovules. Fruit globose, echinate with rather soft spines, ⅓–½ in. diam. (exclusive of the spines), 1-seeded (in Dr. Welwitsch's specimens).

This species is strictly referable to Aublet's genus *Mayna*, the rest of the species of which are tropical American. This genus I have united to *Oncoba* (*vide* Journ. Linn. Soc. ix. 172).

Upper Guinea. Onitsha, Niger, *Barter!* Old Calabar river and Camaroons mountain, 2500 ft., *Mann!*

Lower Guinea. Angola, distr. Golungo Alto, and Pungo Andongo, *Dr. Welwitsch!*

Count Jaubert in Bull. Soc. Bot. France (December 14, 1866), describes a plant from Zanzibar (*Boivin and Grandidier*) and Mombaze (*Boivin*), as the type of a new genus (*Grandidiera Boivini*), but I do not find any character of generic importance in which it differs from *Oncoba*. It is described as a shrub, with ovate, obtuse, mucronate, entire, membranous leaves, axillary flowers; the male spicate, female solitary; sepals 3; petals 5; placentas 3, ∞-ovulate; capsule cristate-alate. I have not seen a specimen.

Speke and Grant gathered, in E. tropical Africa, lat. 6′ S., long. about 34° E., an Oncoboid plant, of which we possess too imperfect material for satisfactory description. Captain Grant described it as a "shrub with snowy-white rosaceous flowers." The structure of the flower agrees with *Oncoba* apparently, but the silky-tomentose leaves are provided with conspicuous oblong stipules.

4. LUDIA, Lam.; Benth. et Hook. f. Gen. Pl. i. 126.

Flowers hermaphrodite. Sepals 5–7, imbricating. Petals 0. Stamens ∞; anthers basifixed, elliptic-oblong, unappendaged, dehiscing longitudinally. Ovary 1-celled, narrowed into the style, which is either 2–4-fid or the stigma 2–4-lobed; ovules 2–∞ in 2–4 parietal placentas. Berry coriaceous.—Shrubs. Leaves venose, shining. Flowers axillary, sessile or shortly pedicellate.

A small genus of the Mascarene group and eastern tropical Africa.

1. **L. sessiliflora,** *Lam.*; *DC. Prod.* i. 261. Wholly glabrous. Extremities apt to be minutely tubercled with numerous lenticels. Leaves coriaceous, shining, rhomboid-oval or -elliptical, subacute or obtuse, cuneate at base; lateral nerves directed forward at a rather sharp angle, looping reticulation prominent above and below, 2–3 in. long, ¾–1¼ in. broad (occasionally considerably larger); petiole about 1 line. Flowers axillary, sessile, solitary or 2–3 together, with 2 or 3 minute bracts around the calyx. Style shortly 2–4-fid or undivided and the stigma lobed.

Mozamb. Distr. Zanzibar, *Dr. Kirk!*
Also in Mauritius.

5. **FLACOURTIA,** Commers.; Benth. et Hook. f. Gen. Pl. i. 128.

Flowers dicœcious. Calyx 4–5(–7)-partite; lobes sometimes unequal, imbricate. Petals 0. Male fl.: Stamens very numerous, with small roundish or subdidymous 2-celled, unappendaged anthers attached at the back and dehiscing longitudinally. Ovary 0. Female fl.: Stamens 0. Ovary surrounded by an annular or interrupted disk, usually 4–8-celled, with a pair of superposed ovules (the upper ascending, the lower pendulous) in each cell; the upper and lower ovules separated at length by spurious dissepiments. Styles 4–8, more or less radiating, persistent; stigmatic apices retuse or emarginate. Fruit a berry, in the African species from 8–16-celled; the cells in 2 series, one above the other, each with a bony endocarp enclosing a solitary seed.—Shrubs or small trees, frequently spinose, with alternate simple leaves. Flowers small, in terminal or axillary racemes or fascicles or small panicles, or the females often solitary. Fruit often edible.

A rather small genus, confined to tropical Asia, China, tropical Africa, and the Mascarene islands.

The species are exceedingly difficult to determine and define.

Leaves coriaceous, glabrous, broadly elliptical, with shallow crenatures, usually rounded or obtuse, veinlets reticulated	1. *F. Ramontchi.*
Leaves firmly membranous or coriaceous, glabrous or glabrescent, crenate-serrate or obsoletely serrulate, pointed or subacuminate. Veinlets somewhat transversely parallel	2. *F. flavescens.*
Leaves very coriaceous, rotundate, denticulate-serrate, softly hairy to the touch	3. *F. hirtiuscula.*

1. **F. Ramontchi,** *L'Hérit. Stirp. Nov.* 59. *t.* 30, 30 *β.* A glabrous shrub or with the young parts and petioles obsoletely puberulous, frequently armed with acute, axillary, ascending or spreading spines, 1–2 in. in length. Leaves shortly petiolate, glabrous, at length shining, and when dry veiny above, broadly elliptical or varying from obovate- to oblong-elliptical; apex usually rounded and obtuse, sometimes broadly pointed; base rounded or more or less cuneate, broadly (sometimes obscurely) crenate or crenate-serrulate, 2–3½ in. long, 1¼ 2½ in. broad. Petiole 3–5 lines. Flowers 1 2 lines diam., in short, few-flowered, terminal racemes or terminating short lateral shoots. Fertile flowers perhaps usually solitary. Styles 5–7, very short, radiate, each longitudinally grooved above. Fruit a roundish, pulpy, edible berry, ½–1 in. diam., with about 10 seeds.

This is the "Batoko Plum" of the Zambesi.

Mozamb. Distr. Race Island, E. Africa, *Forbes!* Zambesi, between Tete and the coast, also on the coast near the mouth, *Dr. Kirk!* Luabo river, *Dr. Kirk!*

Specimens in the Kew herbarium, with male flowers, from Abbeokuta, *Barter!* Dahomey, *Burton!* and Niger, *Baikie!* probably belong to this species, which occurs also in Madagascar and India. For Indian synonymy, see 'Flora Indica,' ined.

2. **F. flavescens,** *Willd.; DC. Prod.* i. 256 (*ex descr.*). A glabrous shrub or small tree, often armed with acute axillary spines, which are sometimes very numerous and rigid on the trunk. Leaves at length somewhat coriaceous, oval or elliptical, more or less pointed or shortly acuminate or obtuse, crenate-serrate or remotely serrulate, the smaller veins somewhat transversely parallel, variable in size, usually 2–5 in. long, 1–2½ in. broad; petiole 3–4 lines. Flowers, both male and female, in small axillary and terminal racemes or racemose panicles, much shorter than the leaves; the female flowers sometimes solitary. Berry small, fleshy.—*F. edulis*, Schum. et Thonn. Guin. Pl. 450. *F. Vogelii*, Hook. f. Fl. Nigrit. 220.

Upper Guinea. Guinea, *Thonning;* Niger, *T. Vogel and Barter!*
Lower Guinea. Golungo Alto, Angola, *Dr. Welwitsch!*

Var. β. Leaves obtuse. Senegal!

Flacourtia gambecola, Clos in Ann. Sc. Nat. Ser. 4. viii. 219, is probably a variety of the same species, from M'Carthy Island, Gambia river.

A variable species in the form and size of the leaves, and very difficult to define. It is nearly allied to one or two Indian and Archipelago species.

3. **F. hirtiuscula,** *Oliv.* A shrub or small tree, in the only specimen seen armed with short acute axillary spines. Leaves rotundate or obovate-elliptical, obtuse or scarcely acute, more or less cuneate, or rounded in very broad leaves at the base, denticulate-serrate or occasionally irregularly toothed, pubescent, at length nearly glabrous above; midrib and long curved lateral nerves rather prominent below, 1½–2½ in. long, 1–1¾ in. broad; petiole 2–4 lines. Flowers not seen. Berries edible, dark-coloured, deeply sulcate when dry, on short, axillary or terminal branches, about the same size as those of *F. Ramontchi*.

Mozamb. Distr. Near Senna, Zambesi, *Dr. Kirk!*

6. ABERIA, Hochst.; Benth. et Hook. f. Gen. Pl. i. 128.

Flowers diœcious. Calyx 5–8-partite, pubescent or glandular, scarcely imbricate or subvalvate in æstivation. Petals 0. Male fl.: Stamens indefinite; anthers shortly oblong or rotundate, attached at the back or base, dehiscing longitudinally. [I have seen female flowers of but one tropical African species, and descriptions of the ovary are contradictory. The ovary is more or less divided into 3–6 cells by intruded plates of pulpy tissue or 1-celled below, several-celled above.] Fruit a berry, 2–6-celled, 2–6-seeded, with a small fleshy annular or interrupted disk. Styles 2–6, persistent. Seeds variously attached to the walls of the cavities, villous or nearly glabrous (in *A. verrucosa* with leafy cotyledons the breadth of the seed, the margins slightly incurved; radicle superior).—Small trees or shrubs, with or without spines. Leaves alternate, simple, shortly stalked. Flowers diœcious. Fruit an edible berry.

A genus of 6 or 8 species, occurring also at the Cape and in Ceylon.

Leaves glabrous or obsoletely pubescent, obscurely veiny. Persistent perianth-segments of fruit oblong or linear-oblong, pubescent. Seeds with villous testa . . . . . 1. *A. abyssinica.*

Leaves glabrous, veiny Persistent perianth-segments of fruit linear, bordered with sessile or subsessile capitate glands. Seeds nearly or quite glabrous . . . . . 2. *A. verrucosa.*

Leaves glabrous, veiny. Persistent perianth-segments of fruit oval or linear-lanceolate, fimbriate-ciliate with long, filiform, capitate glands. Seeds more or less woolly . . . . . 3. *A.? macrocalyx.*

Leaves softly pilose, acute. Persistent perianth-segments of fruit oval or oval-lanceolate, hirsute or pilose on both sides. Seeds villous . . . . . 4. *A. mollis.*

1. **A. abyssinica,** *Clos in Ann. Sc. Nat. Ser.* 4. viii. 236. With or without axillary spines. Leaves dull, rather coriaceous, lanceolate ovate- or obovate-lanceolate or oblong, obtuse or subacute, sometimes rounded towards the apex, undulate-crenate or entire, 1½–3 in. long, 10–15 lines broad. Petiole 1–2 lines long. Fruit puberulous, much exceeding the calyx.—*Flacourtia obtusa*, Hochst. in Schimp. Pl. Abyss. 534. *Roumea abyssinica*, Rich. Fl. Abyss. 34. t. 8.

Nile Land. Abyssinia, *Schimper!*

2. **A. verrucosa,** *Hochst.; Rich. Fl. Abyss.* 34. With or without sharp, straight, axillary spines; the bark often thickly warted with minute lenticels. Leaves coriaceous or rigid, somewhat veiny, lanceolate varying to ovate-lanceolate or obovate, obtuse, sometimes retuse, undulate or entire, 1–2½ in. long, ¾–1 in. broad. Petiole about 1 in. long. Berry edible, glabrous, exceeding the calyx, 2-celled, with a very thin dissepiment; 2-seeded.

Nile Land. Abyssinia, Aber mountains (whence the name of the genus), *Schimper!* Ankober, *Roth!*

3. **A.? macrocalyx,** *Oliv.* A small tree with spreading branches, the extremities at first puberulous, soon glabrous and more or less verruculose, armed with slender straight spreading or ascending axillary spines, ½–1 in. long. Leaves thinly coriaceous, ovate-elliptical elliptical or oval, obtuse or scarcely acute, obtuse or rounded and subtriplinerved at the base, entire, the midrib prominent below, 1½–2½ in. long, ¾ 1¼ in. broad. Petiole 1 line. Flowers not seen, solitary or in few-flowered axillary fascicles. Fruit solitary, axillary, on a peduncle of 2–3 lines, articulated at the base. Sepals 6–8, persistent, free, broadly fimbriate-ciliate with numerous long, slender, minutely pilose, capitate glands, 8–10 lines long; nearly or quite equalling the orange-scarlet ovoid berry. Styles 2, short, filiform, erect, hairy, persistent. Seeds 2, imbedded in pulp, with the testa covered with a lax wool (according to Dr. Welwitsch, who describes the seed as albuminous, with a large straight embryo, ovate-cordate cotyledons, and a superior radicle).

Lower Guinea. Angola, Distr. Pungo Andongo (and Huilla?), *Dr. Welwitsch!*

Were it not that in 3 or 4 of the persistent calyxes, from which the fruit has fallen (or aborted), I find a single attached petal much shorter than the calyx, I should have had less hesitation in referring this plant to *Aberia*.

4. **A. mollis,** *Oliv.* A small, much-branched tree of about 10 ft., with

straight, axillary, acute spines ½–1 in. long. Young twigs pilose-pubescent. Leaves ovate-lanceolate or ovate-elliptical, acute, sometimes acuminate, membranous, softly pilose especially beneath, remotely or obsoletely spinulose-denticulate, 1½–2¼ in. long, ¾–1¼ in. broad. Petiole 1 line. Male flowers very small, axillary, sessile, solitary or two or three together; female flowers very shortly stalked or sessile. Perianth 5–8-partite; segments spreading. Ovary densely and shortly pilose, partially or wholly 3- or 4-celled with 2 or few ovules in each cell, surrounded by a small undulate or interrupted annular disk. Styles 3–4 short, erect, papillose-lobulate at the tip. Berry pilose-pubescent, much exceeding the perianth.

Var. β. *lanceolata.* Leaves lanceolate, acuminate.

Lower Guinea. Angola, distr. Pungo Andongo, *Dr. Welwitsch!*

Dr. Welwitsch collected in Huilla specimens without flower or fruit of a spinose shrub, which will probably prove a fifth species of *Aberia.* The twigs are minutely verruculose and glabrous or puberulous at the tips, the leaves subcoriaceous, ovate or ovate-elliptical, obtuse, entire, glabrous, veiny, 1½–2 in. long, ¾–1⅓ in. broad; petiole 1 line.

7. DASYLEPIS, Oliv.; Benth. et Hook. f. Gen. Pl. i. 972.

Flowers hermaphrodite (or perhaps polygamous). Sepals 4 (or 5), round, coherent at the base, two outside opposite. Petals 4–7, alternate, imbricate, slightly perigynous, with as many small, thick, hairy scales adhering to their bases on the inner side. Stamens indefinite, slightly perigynous, free; anthers linear or linear-oblong, dehiscing longitudinally. Ovary free, glabrous, with 2–4 multiovulate placentas. Style simple; stigma minutely 2–3–4-toothed. Fruit unknown.—A glabrous tree with alternate, somewhat coriaceous, penninerved leaves. Stipules deciduous. Flowers of moderate size in many-flowered axillary racemes.

The following is the only species described.

1. **D. racemosa,** *Oliv.; Journ. Linn. Soc.* ix. 170. Leaves elliptical or oval, with a wedge-shaped base, 6 9 in. long, 2½–3½ in. broad, shortly and obtusely acuminate, slightly denticulate-serrate towards the apex; lateral nerves prominent below. Petiole 4–6 lines. Flowers 6–8 lines diam., on straight pedicels 3–6 lines long, articulated to the axis of the raceme. Racemes about half as long as the leaves. Bracts minute, rounded, scale-like.

Upper Guinea. Camaroons mountain, 2–3000 ft., *Mann!*

Order XIV. PITTOSPOREÆ (by Prof. Oliver).

Flowers regular, hermaphrodite. Sepals 5, free or slightly connate below, æstivation imbricate. Petals 5, exceeding the sepals, free or connate below, more or less spreading above, æstivation imbricate. Stamens 5, hypogynous, free, alternate with the petals; filaments filiform or linear; anthers dehiscing longitudinally (in the African genus), unappendaged. Ovary 2-, rarely 3–5-celled or 1-locular with parietal placentas and indefinite ovules. Style simple, terminal; stigma minute or capitate, entire or toothed. Fruit (in the African genus) a coriaceous capsule dehiscing loculicidally in two valves each bearing a septum on the middle. Seeds albuminous, with a minute embryo; testa smooth

or rugose.—Trees shrubs or undershrubs. Leaves alternate simple entire wavy or toothed, exstipulate. Inflorescence various.

Excepting the large genus *Pittosporum*, which is widely spread in warm countries, the Order is wholly Australian.

1. PITTOSPORUM, Banks; Benth. et Hook. f. Gen. Pl. i. 131.

Sepals free or slightly united at the base. Petals more or less spreading above, free or connivent or coherent into a tube below. Filaments subulate; anthers erect, ovate-oblong. Ovary nearly or quite divided into 2 (rarely 3 or 5) cells by the projecting placentas. Capsule coriaceous or rather woody, globose or obovoid, dehiscing in two entire septiferous valves. Seeds various in form from mutual pressure, often imbedded in viscous fluid.

The African species as they now stand may be said to be endemic, but although sufficiently distinct from each other, they are both very nearly allied to other species occurring in India and the Mauritius.

Leaves oblanceolate; apex rounded obtuse or acute, often rusty-tomentose on expansion. Flowers ¼–⅓ in. Sepals usually more or less tomentose. Ovary pilose . . . . . 1. *P. abyssinicum.*

Leaves oval, attenuate to each end, acute or acuminate, glabrous. Flowers ⅛ in. Sepals and ovary nearly glabrous . . . . . 2. *P. Mannii.*

1. **P. abyssinicum,** *Delile in Ann. Sc. Nat. Ser.* 2. xx. 89. Leaves coriaceous, oblanceolate or obovate-oblong, apex obtuse or rather acute, narrowed below into the petiole, at first more or less covered especially on the midrib with an early deciduous rusty tomentum or appressed pubescence, at length nearly or quite glabrous, 2–4 in. long, ¾–1½ in. broad; petiole up to ¾ in. or more. Flowers usually in umbellate clusters, crowded in dense terminal corymbose panicles, shorter than the surrounding leaves, about ¼ ⅓ in. long. Ovate sepals more or less rusty-tomentose outside. Ovary shortly pilose. Capsule globose or ellipsoidal, sometimes abruptly and shortly narrowed at the base, nearly smooth or minutely tubercled, 2–5 lines diam.—Rich. Fl. Abyss. Atlas, t. xi.

Nile Land. Abyssinia, *Schimper! Roth!* and others; Bahr-el-Abiad (*Schweinf. et Asch. Enum.*).

Var. *angolensis.* Nearly or quite glabrous, the inflorescence puberulous.

Lower Guinea. Angola, Distr. Huilla, *Dr. Welwitsch!*

Very nearly allied to, if indeed specifically distinct from, *P. viridiflorum*, Sims, of the Cape.

2. **P. Mannii,** *Hook. f. in Journ. Linn. Soc.* vi. 5. A shrub or small tree attaining 20–30 ft. Leaves firmly membranous or rather coriaceous, oval or oblong-elliptical, narrowed to each end, acute or acuminate, somewhat wavy, glabrous, 2–5 in. long, ¾–1¾ in. broad; petiole ½–1 in. Panicles branched, many-flowered. Flowers small, about 2 lines long. Calyx-lobes often rather unequal, free or irregularly and very shortly connate, nearly glabrous. Ovary nearly or quite glabrous. Capsule globose, about ¼ in. diam.

Upper Guinea. Clarence Peak, Fernando Po, 8–9000 ft., and Camaroons mountain, 5–7000 ft., *Mann!*

Order XV. POLYGALEÆ (by Prof. Oliver).

Flowers irregular, hermaphrodite. Sepals 5, free or 2 anterior connate, 2 inner (*wing-sepals*) larger, petaloid, wing-like, rarely subequal. Petals 3 or 5, declinate, free from each other but usually adherent to the staminal sheath, lower petal (*carina*) concave or galeate. Stamens 8, 5 or 6, monadelphous, the sheath open above and usually adnate to the base of the petals; anthers 1- or 2-celled, opening by a transverse valve or terminal pore. Ovary 2-celled or 1-celled by abortion or (in *Carpolobia*) 3-celled. Style simple, often incurved, filiform or variously dilated above; stigma lobed. Fruit a compressed 2-celled capsule dehiscing loculicidally by the margins, baccate and 1–3-celled, or samaroid. Seeds pendulous, frequently strophiolate; testa often pilose; embryo axile with flattened cotyledons and a short superior radicle, with or without a fleshy albumen.—Herbs shrubs or rarely arborescent; diffuse erect or scandent. Leaves usually alternate, simple, entire, exstipulate. Flowers racemose capitate or panicled, bracteate.

A considerable and widely-spread Order of temperate and tropical countries.

Petals 3. Stamens 8 (or 6). Ovary 2-celled. Fruit a compressed capsule	1. Polygala.
Petals 3. Stamens 8. Ovary 1-celled by abortion. Fruit a samara .	2. Securidaca.
Petals 5, nearly equal. Stamens 5. Ovary 3-celled. Fruit drupaceous	3. Carpolobia.

1. POLYGALA, Linn.; Benth. et Hook. f. Gen. Pl. i. 136.

Flowers irregular. Sepals 5, unequal, free or the 2 anterior connate, 2 interior (wing-sepals) much larger, petaloid and wing-like, deciduous or persistent. Petals 3, separately adnate to the sheath of stamens; median petal (carina) usually exceeding the 2 lateral petals, galeate, usually crested on the back, if 5 petals the 2 upper are minute and squamiform. Stamens 8 (or 6), monadelphous, the sheath open above and adherent below to the petals; "anthers 1- or 2-celled." Ovary 2-celled with 1 ovule in each cell. Style incurved above and often dilated; stigma various. Capsule membranous or coriaceous, compressed, usually emarginate or 2-fid, dehiscing loculicidally at the edges. Seeds usually strophiolate and pilose, with or without albumen. —Herbs or shrubs. Leaves alternate or fascicled, rarely opposite or verticillate. Flowers in terminal or lateral, axillary or extra-axillary racemes or heads, usually rather small, colour various.

A large genus of temperate and tropical climates in both hemispheres. 30–40 species are peculiar to the Cape Flora. Of the 20 tropical African species but 3 appear to be common to India, 3 occur within the limits of the Cape Flora, and but 1 is identifiable with a New World species. 15 or 16 are confined to tropical Africa, and of these but 4 occur in both the east and west of the continent, the majority being western.

A. Anterior sepals free.

* *Bracts persistent, at least until expansion of the flowers.*

Racemes terminal.

Wings about ½ in. diam., orbicular, showy. Leaves linear-lanceolate or linear. Pedicels pilose	1. *P. Gomesiana.*
Wings not exceeding ½ in. Erect, probably 2–3 ft. Leaves linear. Lateral petals hooked or semihastate	2. *P. multiflora.*

Erect, 1–3 ft. Leaves linear, tapering. Lateral petals entire or slightly depressed on oblique inner side . . . . . 3. *P. tenuicaulis.*
Erect, slender, 1–2 ft. Leaves filiform. Lateral petals with erect lateral tooth or 2-fid . . . . . 4. *P. sparsiflora.*
Forking or diffuse, 3–24 in. Leaves linear to obovate-elliptical obtuse. Flowers reflexed in dense strobiliform heads, the lower often axillary . . . . . 5. *P. arenaria.*
Erect or decumbent. Leaves oval or lanceolate, acute. Racemes 2–4 in. Wings very obtuse, 5–3-nerved . . . . . 7. *P. persicariæfolia.*

Racemes lateral.

Ascending or diffuse. Leaves linear or oblong, obtuse. Flowers fascicled or racemes much shorter than leaves, pubescent . . 6. *P. triflora.*
Erect or decumbent. Leaves oval or lanceolate, acute. Racemes 2–4 in. or lower congested. Wings very obtuse, 5–3-nerved . 7. *P. persicariæfolia.*
Wiry, suffrutescent. Leaves oblanceolate, obtuse. Racemes very short. Wings broadly ovate with numerous looping nervures . 8. *P. Senensis.*
Shrubby, about 6 in. Leaves rather rigid, elliptical, mucronulate, reticulate. Racemes few-flowered, extra-axillary. Wings elliptical, narrower than capsule . . . . . 9. *P. Myrtillopsis.*

(Compare *P. arenaria.*)

* *Bracts caducous. Racemes terminal.*

(Compare *P. Gomesiana.*)

Strophiole conspicuous.

Erect or ascending. Leaves linear or oval, apiculate. Lateral petals orbicular, unguiculate . . . . . 10. *P. abyssinica.*
Leafy herb of about 6 in. Leaves large, obovate-elliptical, ¾–1¼ in. broad. Wings deciduous . . . . . 11. *P. Mannii.*

Strophiole obsolete.

Depressed, wiry. Leaves oblanceolate obtuse or retuse. Lateral petals obovate-cuneate . . . . . 12. *P. irregularis.*
Filiform. Leaves filiform. Wings elliptical, equalling elliptical obtuse capsule . . . . . 13. *P. paludosa.*
Filiform. Leaves ¼ in., lanceolate or linear. Flowers rather dense. Wings roundish-elliptical, much longer than ovate-orbicular, nearly entire capsule . . . . . 14. *P. capillaris.*
Two to four inches. Leaves linear. Flowers rather crowded. Wings nearly orbicular. Capsule orbicular, emarginate or subentire . . . . . 15. *P. micrantha.*

B. Anterior sepals connate.

Wing-sepals deciduous.

Shrub. Leaves acicular (or narrow-linear), fascicled . . . . 16. *P. acicularis.*
Slender erect annual. Leaves filiform. Flowers rather distant, in slender racemes . . . . . 17. *P. guineensis.*

Wing-sepals persistent.

Branches slender. Leaves narrow-linear or filiform. Flowers in terminal erect racemes. Carina cristate . . . . . 18. *P. rarifolia.*
Erect, slender. Leaves linear, narrowed to each end, membranous. Racemes terminal. Crest 0 . . . . . 19. *P. Petitiana.*
Wiry undershrub 1 ft. or less. Leaves linear or oblanceolate, pointed or mucronulate. Racemes terminal or extra-axillary, often very short . . . . . 20. *P. Huillensis.*

1. **P. Gomesiana,** *Welw. in Linn. Trans.* xxvii. (*ined.*) *t.* 4. An

erect, perennial, branching, showy herb attaining 3–6 ft. in height, glabrous below, minutely pilose or pubescent above. Leaves firmly membranous, ascending, very shortly petiolate, linear-lanceolate or linear, acute, in the broader forms narrowed to each end, glabrous or pilulose, 2–3 in. long, from $\frac{1}{12}$–$\frac{1}{2}$ in. broad. Racemes erect, terminal, ample, many-flowered, often 6–12 in. long, $1\frac{1}{2}$–$2\frac{1}{2}$ in. diam.; bracts and bracteoles persistent or soon deciduous, membranous, ovate to ovate-lanceolate, the former often with a subulate or aristate tip and $\frac{1}{4}$ in. in length. Pedicels patent, usually $\frac{1}{2}$ in. or under, slender, pilose with spreading hairs. Outer sepals pilose externally. Wing-sepals orbicular, netted from the base with numerous radiating anastomosing nervures, pale or assuming a brilliant crimson, about $\frac{1}{2}$ in. diam. Lateral petals sharply and obliquely recurved, oblong, with an auricled loop on the outer margin on passing into the dilated pilose base, shorter than the ample much incurved or galeate keel. Capsule obovate-oblong or broadly obcordate, much shorter than the wings, narrowly alate.

Lower Guinea. Angola, prov. Huilla, *Dr. Welwitsch!*
Mozamb. Distr. Lake Nyassa, *Dr. Kirk!*

2. **P. multiflora,** *Poir.*; *DC. Prod.* i. 333 (*ex descr.*). An erect, apparently shrubby plant of probably 2–3 ft., minutely puberulous above, the hairs sometimes collected in faint longitudinal lines, with ascending, firm, flowering branches from the base of the primary, elongate, erect, terminal raceme. Leaves linear, tapering towards the ends, 2–3 in. long, $\frac{1}{6}$ in. wide. Racemes at length 9–12 in.; bracts persistent, minute. Pedicels filiform, spreading, equalling or exceeding the outer sepals. Wing-sepals obliquely rotundate, shortly unguiculate, with about 5 looping nerves. Lateral petals broadly elliptical with a recurved tooth towards the base on the inner side. Capsule elliptic-oblong, retuse, ciliate, not winged.

Upper Guinea. Sierra Leone!
Excepting that Poiret includes *P. multiflora* amongst the species characterized by *corolla imberbis*, our plant agrees very well with his description. His plant, moreover, was from Sierra Leone (*Commerson*). *P. Donii*, Hook. f. Fl. Nigrit. 222, I have not seen, but from the description I think it may be identical with the above.

3. **P. tenuicaulis,** *Hook. f. in Journ. Linn. Soc.* vii. 182. An erect or ascending, more or less branched annual, the stem minutely pubescent or puberulous, 1–3 ft. in height. Leaves linear, tapering to an acute point or in larger-leaved forms rather obtuse, minutely pubescent or glabrate, $\frac{3}{4}$–6 in. long, 1–5 lines broad. Flowers reddish, in terminal, many-flowered, often rather dense, secund racemes. Pedicels equalling the outer sepals, or flowers subsessile; bracts lanceolate-subulate, persistent, at length spreading or recurved. Wing-sepals ovate-rotundate or broadly obovate, with 3–5 principal looping nerves. Lateral petals obliquely ovate or ovate-oblong, entire or with a broad depression on the inner side. Capsule quadrate-elliptical to obovate-oblong, retuse, ciliolate, rather shorter than the wings, scarcely or not at all winged.

Upper Guinea. Camaroons mountain, 7000 ft., *Mann!*
Var. *longifolia*. Leaves attaining 6 in. Racemes very dense. Nupe and on the Kworra, *Barter!*

4. **P. sparsiflora,** *Oliv.* A very slender, simple or forked, erect, mi-

nutely puberulous annual of 1–2 ft., with scattered filiform leaves ½–1 in. long. Flowers in terminal erect racemes of 2–12 in. Pedicels about equal to the free outer sepals; bracts very minute, subulate, persistent. Wing-sepals obovate-rotundate, minutely pubescent, with 3–5 principal looping nerves. Lateral petals with a short erect tooth on the inner side or broadly and nearly equally 2-fid. Capsule obovate-oblong, retuse, pubescent or glabrous, not winged.

Var. *α*. Lateral petals with tooth on inner side.

Upper Guinea. Sierra Leone, *Morson !*

Var. *β*. Lateral petals equally obtusely 2-fid.

Lower Guinea. Angola, prov. Pungo Andongo, *Dr. Welwitsch !*

Were it not for the difference in the form of the lateral petals, I should have been strongly inclined to unite this plant with *P. tenuicaulis* or *P. multiflora*.

5. **P. arenaria,** *Willd.; DC. Prod.* i. 326. A very variable annual herb from a few inches to 1 or 2 ft. in height, erect and forking or diffuse with divaricate branches. Leaves from linear to oval or obovate-elliptical, obtuse or rarely subacute, narrowed to the base, sessile or petioles up to 2 lines, more or less shortly hirsute- or pilose-pubescent at least when young, 1–3 in. long, ¼–¾ in. broad. Flowers reflexed, crowded on short, thick, shortly peduncled or sessile clover-like heads or racemes usually shorter than the leaves, often over-topped by lateral branches, or sometimes axillary and when numerous almost confluent, forming an interrupted or leafy spicate or strobiliform inflorescence. Outer sepals strongly herbaceous. Wing-sepals variable in size, ovate or ovate-rotundate, often very oblique, nerves faint or decided at the base only. Lateral petals obliquely ovate or elliptical, entire or obscurely and obtusely lobed on the inner side. Capsule obovate or elliptical, emarginate, more or less narrowly winged in front, pubescent, shorter than the wings.—*P. nutans*, Hook. f. Fl. Nigrit. 222.

Upper Guinea. By the Niger, *Barter ! T. Vogel !* and others.
Nile Land. Upper Nile, *Speke and Grant !*
Lower Guinea. Congo, *Smith ! Burton !* Angola, *Dr. Welwitsch !*

Var. *andongensis*. 1 to 6 in. tall. Leaves oval to obovate-elliptical. Flower-heads terminal and axillary. Lateral petals rotundate. Capsule entire.—Angola, prov. Pungo Andongo, *Dr. Welwitsch !*

Of this species I have had the opportunity, through the courtesy of Dr. Welwitsch, of examining a most extensive and well-selected set, which convinces me that very considerable range must be allowed to it in the form and size of the leaves and general form of the inflorescence, the aspect of the latter varying with the development of axillary heads below, which often become confluent. The little plant distinguished as var. *andongensis* may be considered entitled to specific distinction on account of its entire capsules, but in other respects it is very similar to the common form. A variety of this plant grows at Natal.

6. **P. triflora,** *Linn.; DC. Prod.* i. 333. An erect, diffuse or decumbent, often much-branched, pubescent or puberulous annual, the erect form attaining 1 or 2 ft. Leaves narrow-linear to linear-oblong, more or less pointed obtuse or even retuse in the broad-leaved forms, pubescent strigillose or glabrate, usually ½–1 in. long, ½–2 lines broad, sometimes shorter and narrower. Flowers in extra-axillary or axillary, few-flowered fascicles heads or racemes, much shorter than the leaves, sometimes solitary. Bracts

persistent. Wing-sepals oval or obliquely elliptical, pubescent, with a principal median often broadly herbaceous nerve, and faint looping and divergent lateral ones. Lateral petals obovate to ovate. Capsule ovate-elliptical to obovate, emarginate, pubescent, scarcely winged, shorter than the wing-sepals.—*P. Vahliana*, DC. Prod. i. 326. *P. erioptera*, DC. l. c.; Deless. Ic. iii. t. 15. *P. obtusata*, DC. l. c. *P. oligantha*, Rich. Fl. Abyss. i. 38. *P. retusa* and *P. nubica*, Hochst. in Pl. Kotschy, Nub. *P. linearis*, R. Br. in Salt, Abyss. App. 65.

Var. α. *diffusa*. Leaves linear-oblong, usually obtuse.
North Central. Kouka, Central Africa, *E. Vogel!*
Nile Land. Kordofan, *Kotschy!* Nubia, *Schweinfurth!*
Lower Guinea. Angola, Prov. Loanda, *Dr. Welwitsch!*
Var. β. *erecta*. Leaves narrow-linear.
Upper Guinea. Senegambia, *Perrottet!*
Nile Land. Kordofan, *Kotschy!* Abyssinia, *Schimper!*
Also in the Cape Verde Islands.

I believe the above to be forms of one widely-distributed species, extending east to India, where it appears to be common.

7. **P. persicariæfolia,** *DC. Prod.* i. 326. An erect or decumbent, usually branching annual, of 1–3 ft. Stem thinly pilose pubescent or puberulous. Leaves membranous, oval to linear-lanceolate, acute acuminate or rather obtuse, mucronulate, shortly hispid-pubescent or -puberulous, at least when young, 1–3½ in. long, 1½–9 lines broad, subsessile or shortly petiolate. Flowers in extra-axillary or terminal racemes or from the forks, growing out to 2–4 in. or the lower flowers fascicled in the axils of the leaves, which much exceed them. Pedicels capillary below, spreading, exceeding or about equalling the outer sepals. Bracts subulate, spreading or reflexed, persistent. Wing-sepals rotundate-ovate, obtuse, with 3–5 looping nerves, glabrous or nearly so, exceeding the quadrate-rotundate, emarginate, narrowly-winged ciliolate capsule. Lateral petals abruptly narrowed, semi-hastate or hooked at the base inside.—Wall. Pl. As. Rar. ii. 79. t. 184. *P. sphenoptera*, Fres. in Mus. Senck. ii. 274 (probably a stunted form, similar to a specimen in Herb. Kew. from Abyssinia, *Roth*). *P. Wallichiana*, Wt. Ill. i. 49. t. 22 A. *P. Quartiniana*, Rich. in Ann. Sc. Nat. Ser. 2. xiv. 263; Fl. Abyss. Atlas, t. 9. *P. granulata*, Hochst., and *P. punctulata*, Hochst. Rich. Fl. Abyss. i. 39. *P. hypericoides*, Webb, Frag. Fl. Æthiop. 31 (a form with tufts of flowers from the axils of the lower leaves).

Nile Land. Abyssinia, *Schimper! Schweinfurth!*
Lower Guinea. Bumbo, Angola, *Dr. Welwitsch!*
Mozamb. Distr. Zambesi, *Dr. Kirk!*

Var. *latifolia*. Decumbent. Leaves oval, penniveined, strigillose-pubescent on the veins beneath. Manganya Hills, 3000 ft., *Dr. Kirk!*

Occurs in S. extratropical Africa, also in the Himalaya and mountains of peninsular India.

8. **P. Senensis,** *Klotzsch in Peters' Mossamb. Bot.* 113.—A rather wiry or rigid puberulous herb or undershrub, 1–2 ft. high in the suffrutescent form, with straight, divaricate branches. Leaves oblanceolate to oblong, obtuse, occasionally somewhat pointed, puberulous, usually ½–1½ in. long, 2–4 lines broad; petiole ½ line or leaves subsessile. Flowers in very short,

lateral racemes or axillary fascicles, shorter than the leaves or pedicels, equalling or exceeding the outer free sepals. Bracts and bracteoles herbaceous, lanceolate. Wing-sepals rotundate-ovate, with numerous radiating, looping nervures. Lateral petals ovate, considerably shorter than the keel. Capsule quadrate-rotundate, retuse, minutely pubescent, scarcely or not at all winged, enclosed by the wing-sepals.—*P. obtusissima*, Hochst. in Pl. Schimp. Abyss.

Nile Land. Abyssinia, *Schimper!*
Mozamb. Distr. Zambesi, *Dr. Kirk!*

9. **P. Myrtillopsis,** *Welw. mss.* A low herb of about 6 in., with shrubby habit, giving off numerous ascending, shortly hirsute branches from the thick root-stock. Leaves somewhat rigid, oblong-elliptical, mucronulate, glabrous or ciliolate, finely reticulate-venulose, sessile or subsessile, ½–1 in. long, ¼–⅓ in. wide. Flowers nodding, in short, extra-axillary, few-flowered racemes of ½ in. or less. Bracts subulate, persistent, shorter than the pedicels. Wing-sepals green, obliquely obovate-oblong, narrowed below, slightly mucronulate. Capsule rotundate-obcordate, emarginate, narrowly-winged, ciliolate, broader, but shorter, than the wings.

Lower Guinea. Angola, prov. Huilla, *Dr. Welwitsch!*

In habit resembling the Indian *P. arvensis*, from which its more rigid, reticulated leaves distinguish it; it approaches also *P. japonica*, differing in the capsule and wings.

10. **P. abyssinica,** *Fresen. in Mus. Senck.* ii. 273. Occurring both as an annual and with a woody, branching, no doubt perennial stock; erect or ascending, forking or a good deal branched below, from ½ to 2 ft., minutely pilose towards the extremities in the tropical specimens. Leaves linear, tapering to a fine point, or in the depressed perennial form oblong or narrowly elliptical, apiculate, pilulose or glabrate, very shortly petiolate, ½–1½ in. long, 1–3 lines broad. Flowers secund, in terminal, sometimes elongate racemes; pedicels spreading, about equal to the free outer sepals. Bracts early deciduous. Wing-sepals ovate, narrowed at the base, sometimes so much so as to appear obovate, with 3 nerves connected towards the apex. Lateral corolla-lobes shorter than the median, orbicular, shortly narrowed below or unguiculate. Capsule obovate, emarginate, narrowly winged in front, glabrous or nearly so.—*P. hottentotta*, Presl, Bot. Bem. 15. *P. Gerardiana*, Wall. Cat. 4187. *P. adoensis*, Hochst. in Pl. Schimp. Abyss.

Nile Land. Abyssinia, *Salt! Schimper!* and others.

Var. *rupicola*, much-branched at the base, pilose, with oval or oblong leaves (*P. rupicola*, Hochst. et Steud. in Rich. Fl. Abyss. i. 36).

Abyssinia, *Schimper!*

I have but little hesitation in identifying *P. hottentotta* of S. extratropical Africa and *P. Gerardiana* of the Himalaya with the Abyssinian plant. Perhaps *P. leptalea*, DC., and *P. oligophylla*, DC., may prove to be synonymous. The two latter are identified by Mr. Bentham.

11. **P. Mannii,** *Oliv.* A low, leafy, perennial herb, a few inches in height, apparently with a prostrate stem or rhizome. Ascending axis simple, glabrous or nearly so. Leaves large, membranous, obovate-elliptical or oblanceolate, more or less acuminate, narrowed into the petiole, slightly denticulate forward or entire, glabrous, 2–4 in. long, ¾–1¼ in. broad; petiole

$\frac{1}{6}$–$\frac{1}{2}$ in. Raceme terminal, shorter than or equalling the upper leaves, rather dense and conical above. Flowers very shortly pedicellate; pedicels $\frac{1}{2}$ line or less; bracts early deciduous. Outer sepals free. Wing-sepals obovate, faintly nerved, nerves diverging from the base; deciduous. Lateral petals oblong, obtuse, equalling the keel. Capsule obovate-rotundate, retuse, glabrous.

Upper Guinea. Sierra del Crystal, *Mann!*

12. **P. irregularis,** *Boiss. Diag.* i. *Fasc.* i. 8. A low, spreading, wiry plant, branching from a woody stock; branches puberulous, with minute, appressed hairs. Leaves, especially the lower, oblanceolate or obovate-oblong, obtuse or retuse, often with a minute, recurved mucro; upper very small, narrower, strigillose-puberulous or glabrescent, more or less glaucous in our specimens, not exceeding $\frac{1}{2}$ in. in length. Flowers remote, in loose, terminal, spreading racemes; pedicels equalling the outer, free, broadly-elliptical sepals; bracts early deciduous. Wing-sepals broadly-ovate, with 3 nerves united above and minute, spreading, lateral veinlets. Lateral petals ample, extremely delicate, broadly obovate-cuneate. Capsule obliquely-obovate, winged, glabrous.

Nile Land. Sennar, *Kotschy!*
Also in Arabia, I think, as *P. arabica,* Boiss., seems scarcely different.

13. **P. paludosa,** *St. Hil. Fl. Bras. Merid.* ii. 8, *var.* A very slender, filiform, erect, glabrous annual, of 4–12 in., with forking, ascending branches and scattered, acicular or filiform leaves, of $\frac{1}{2}$ in. or less. Flowers in erect, terminal racemes, very small; pedicels about equal to the outer free sepals, spreading; bracts subulate, early deciduous Wing-sepals persistent, elliptical, obtuse, with 3 faint nerves, the lateral ones soon lost. Lateral petals lanceolate, nearly equal to the keel. Capsule elliptical, a little narrowed at the base, rather obtuse, equal to the wings. Seeds estrophiolate, pilose, with appressed hairs.—*P. paniculata,* Linn., var. *africana? DC. Prod.* i. 329.

Upper Guinea. Sierra Leone!
Also in Brazil.

14. **P. capillaris,** *E. Mey.* (*Harv. in Fl. Capensis,* i. 93), var. *angolensis.* A very slender, erect, glabrous annual, of 1 ft. or more, usually branched from the base. Leaves scattered, very small, erect, lanceolate or linear, about $\frac{1}{4}$ in. long. Flowers small, cream-coloured or greenish, in erect, rather dense, terminal, spicate racemes. Bracts subulate, very early deciduous; pedicels equalling or shorter than the outer free sepals. Wing-sepals elliptical-rotundate, with the lateral faint nervures dying out. Lateral petals ovate-lanceolate, nearly equalling the keel. Capsule ovate-orbicular, minutely apiculate or scarcely emarginate when dry, two or three times shorter than the wings. Seeds with short, curved hairs; strophiole obsolete.

Lower Guinea. Angola, prov. Huilla, *Dr. Welwitsch!*
Occurs also south of the tropic.

15. **P. micrantha,** *Guill. et Perr. Fl. Seneg.* i. 39. An erect, branching or simple, glabrous annual, of 2–6 in. Leaves scattered, rather fleshy, linear, acute, about $\frac{1}{4}$–$\frac{1}{3}$ in. long. Flowers minute, in terminal, leafless racemes, often crowded towards the apex; pedicels filiform, not exceeding the

outer sepals or flowers sessile; bracts caducous. Wing-sepals obovate to orbicular, very faintly 3-nerved, the nervures soon dying out. Lateral petals obliquely ovate-lanceolate. Capsule nearly orbicular, scarcely notched, subglabrous. Seeds without a distinct strophiole, shortly hairy, the hairs loose, with circinate-capitate tips in the Angola specimens, as noticed first by Dr. Welwitsch.

Upper Guinea. Senegambia, *Perrottet!*
Lower Guinea. Angola, provs. Pungo Andongo (flowers cream-coloured) and Huilla (flowers rose or purple), *Dr. Welwitsch!* Also in Cape Verde Islands, according to Webb.

16. **P. acicularis,** *Oliv.* A glabrous shrub with stout rigid branches bearing somewhat tufted, erect, leafy twigs terminating in short rigid racemes. Leaves acerose or very narrow-linear, numerous, scattered or in fascicles of 3–4, rather pungent, midrib depressed above, prominent beneath in the acicular form, ¾–2 in. long. Racemes erect terminal or on tufted lateral rigid ramuli. Pedicels much shorter than the outer sepals or flowers subsessile; bracts caducous. Anterior sepals connate, 2-dentate. Lateral petals obovate or rotundate. Wing-sepals obovate-oblong, faintly nerved, deciduous with the corolla. Capsule elliptical or obovate, narrowly notched or emarginate, glabrous; stigma circinate with a membranous wing.

Nile Land. Near Madi, White Nile, *Speke and Grant!*
(? Quorra, *Barter*, a very imperfect specimen.)

17. **P. guineensis,** *Willd.; DC. Prod.* i. 332 (*Fl. Nigrit.* 223). A very slender, erect, forking, glabrous annual attaining 2–3 ft. with striate stem and scattered filiform leaves ½–1 in. long. Flowers small, orange and red, secund, in slender terminal racemes, sometimes distant; pedicels slender below, subclavate, patent or deflexed, equalling the outer sepals, the two anterior of which are connate and 2-fid; bracts caducous. Wing-sepals obovate, much narrowed below, deciduous. Lateral petals rotundate. Capsule obovate-oblong with a broad triangular notch very conspicuous in the half-ripe fruit.

Upper Guinea. Niger, *Ansell! Barter!*
Willdenow's description is much too brief to enable me to identify this plant certainly. Schumacher and Thonning, who take up the same name in their Beskr. Guin. Planter, describe their plant as with 'perianthium triphyllum,' and do not refer to the cohesion of the anterior sepals. It is possible, therefore, that they had a different plant in view.

18. **P. rarifolia,** *DC. Prod.* i. 332 (*ex descr.*); *Fl. Nigrit.* 222. Shrubby, with slender, erect, glabrous branches strongly ridged when dry. Leaves scattered, often remote, very narrow-linear or filiform, erect or appressed, ¼–2 in. long, ½–2 lines broad. Flowers glabrous or pilose, in terminal, erect racemes; pedicels spreading, equalling or shorter than the outer sepals; bracts minute, caducous. Anterior sepals connate, entire or bidentate. Wing-sepals pale, oblong- or rotundate-ovate, shortly narrowed at the base with 3 principal looping (not coloured) nervures, persistent, ⅓ in. in length. Lateral petals ample, rotundate-obovate, narrowed below. Carina cristate. Capsule ovate- or quadrate-elliptical, retuse, exalate or the lobes more or less produced at each side of the notch, glabrous, about as broad as and at length nearly or quite equalling the wings.—*P. tenuifolia,* Link

(Harv. in Fl. Capensis, i. 88, and syns.). *P. stenopetala*, Klotzsch in Peters' Mossamb. Bot. 114. t. 23 (as *P. stenophylla*).

Upper Guinea. Sierra Leone, *Don !.*

Lower Guinea. Angola, provs. Pungo Andongo, and (with flowers pilose) Huilla, *Dr. Welwitsch !*

Var. *melanophleba* (Welw.). Flowers smaller. Wing-sepals ovate, narrowed at the base, with 3 conspicuous coloured looping nervures. Capsule obovate, shorter than the wings. Angola, prov. Huilla, *Dr. Welwitsch !*

The same plant grows in Natal and Caffraria; a form very near to *P. melanophleba*, differing in having flowers twice as large and wings not marked by coloured nerves.

19. **P. Petitiana,** *Rich. Fl. Abyss.* i. 37. A glabrous, erect, leafy, usually branching annual of 6–12 in. Leaves plane, membranous, linear, narrowed to each end and finely pointed, 1–2 in. long, 1½–2 lines broad. Flowers in terminal erect racemes; pedicels usually exceeding the outer sepals, subclavate, spreading or decurved; bracts subulate, caducous. Anterior sepals connate, emarginate. Wing-sepals ovate, often much narrowed to the base, with 3 looping dark-coloured nerves, persistent. Lateral petals rotundate or broadly obovate. Crest 0. Capsule oblong-elliptical, broadly emarginate, exalate, glabrous, as long as and broader than the wings.—*P. tetrasepala*, Hochst. in Pl. Schimp. Abyss.

Nile Land. Abyssinia, *Schimper ! Petit !*

20. **P. Huillensis,** *Welw. mss.* A low, wiry and shrubby, glabrous or puberulous herb of 1 ft. or under, with numerous diffuse or decumbent sometimes elongate branches, from a much divided root-stock. Leaves rather thick, linear or oblanceolate-linear, pointed or obtuse and mucronulate or sometimes emarginate, narrowed to the base, glabrous, sessile or subsessile, ¼–1 in. long, $\frac{1}{10}$–⅛ in. wide. Flowers in loose terminal or extra-axillary racemes, sometimes 2–3 in. long, often very short or flowers solitary. Bracts very early deciduous; pedicels ¼ in. or less, after flowering sharply reflexed or patent, thickened upwards into the outer sepals, the anterior of which are connate and 2-fid. Wing-sepals greenish, elliptical, narrowed below with 3 principal nerves. Lateral petals obovate-cuneate, nearly equalling the keel. Capsule quadrate-elliptical, emarginate, not winged, glabrous. Seeds pubescent.

Lower Guinea. Angola, prov. Huilla, *Dr. Welwitsch !*

P. Figariana, *Webb, Frag. Fl. Æthiop.* 31. Suffrutescent, branching. Branches reticulate-striate. Leaves sparse, linear, acute, subsessile. Spikes terminal. Bracts linear-lanceolate, subulate. Smaller sepals acute, red; lateral (wings) roundish-ovate, hyaline, penninerved, as long as the cristate, much-incurved, apiculate keel. Capsule?

Nile Land. Sennar?

The description, based upon a single flowering specimen, is taken from Mr. Webb. I have failed to identify it.

P. conosperma, *Bojer in Ann. Sc. Nat Ser.* 2. iv. 266. A rather weak herb of 1–2 ft.; stem simple, 2–3-forked above with terminal racemes, glabrous. Leaves erect linear acute or mucronate, glabrous, obtuse at the base, 2 in. long, 1½–2 lines broad. Racemes ample, erect, many-flowered. Flowers pedicellate, secund, pale rose. Bracts setaceous, caducous, exceeding the pedicels. Outer sepals 2, navicular, acute, half as long as the inner

which are oval-oblong, acute, dilated below, rose-veined, glabrous. Lateral petals unguiculate, 2-lobed. Seeds conical, pubescent, with a yellow arillus.

Mozamb. Distr. Mombasc Island, *Bojer.*
I have not identified this plant, and doubt under which section in the 'Clavis' it belongs.

2. SECURIDACA, Linn.; Benth. et Hook. f. Gen. Pl. i. 138.

Flowers irregular. Sepals 5, unequal, two (wing-sepals) much larger, petaloid and wing-like. Petals 3, distinct from each other, adnate below to the sheath of stamens, median petal (carina) galeate; if 5 petals the 2 upper squamiform and rudimentary. Stamens 8, monadelphous, the sheath split above and adherent at the base to the petals; anthers 2-celled, dehiscing by a triangular recurved valve in front. Ovary 1-celled (one cell being abortive), with 1 ovule. Style oblique, incurved above. Fruit a samara. Seed estrophiolate, glabrous, exalbuminous.—Shrubs usually scandent, or small trees. Leaves alternate, entire. Flowers in terminal and axillary racemes or panicles.

A considerable genus in Tropical America, represented by few species in the Old World and but by two in Africa, one of which is widely distributed and very variable.

Branches pubescent. Leaves more or less oblong, obtuse, rarely exceeding 1–2 in. by ¼–¾ in. Flowers in racemes . . . . 1. *S. longipedunculata.*
Branches glabrous. Leaves broadly elliptical or obovate, shortly acuminate, 2–4 in. by 1–2 in. Flowers in racemes or panicles 2. *S. Welwitschii.*

1. **S. longipedunculata,** *Fres. in Mus. Senck.* ii. 275. A much-branched divaricate shrub sometimes attaining 8–10 ft., the extremities minutely pubescent or shortly hirsute, rarely glabrate. Leaves coriaceous, oblong to linear- lanceolate- or ovate-oblong, obtuse or rounded at the apex; margin more or less revolute when dry, glabrous or glabrescent, paler and venation usually obscure beneath, ¾–2 in. long, ¼–¾ in. broad; petiole 1–3 lines. Flowers rose or shades of purple or violet or variegated with white, in terminal spreading racemes of 1–3 in. or upon short lateral shoots; bracts and bracteoles minute, lanceolate, deciduous; pedicels ¼–½ in., pubescent. Lateral petals ovate to obovate-elliptical, a little recurved at the tip. Samara 1½–2½ in. long with a notch at the base on the side of the aborted cell of the ovary, wing variable, the ventral margin nearly straight or much curved, gradually or abruptly narrowed into the smooth or rugulose nut, with numerous, curved, parallel, forking nervures, ½–1 in. broad.—*Lophostylis oblongifolia* and *L. angustifolia,* Hochst. in Flora 1842, 231; Rich. Fl. Abyss. i. 39-40; Atlas, t. 10. *L. pallida,* Klotzsch in Peters' Mossamb. Bot. 115. t. 22.

Upper Guinea. Senegal, *Sieber!* Quorra, *T. Vogel!*
Nile Land. Abyssinia, *Schimper!* Sennar, *Cienkowski.*
Mozamb. Distr. Rovuma river and Maunganya Hills, *Drs. Kirk and Meller!*

Var. *parvifolia.* Leaves considerably smaller, often elliptical (wing of fruit rather abruptly narrowed at base in Angola sp.).

Upper Guinea. Nupe, Niger, *Barter!*
Lower Guinea. Angola, provs. Huilla and Pungo Andongo, *Dr. Welwitsch!*
The bark of this plant affords the Buaze fibre of Zambesiland. Dr. Kirk brought from the Batoka Highlands a specimen in fruit only of what he considers a distinct species allied

to the above, with short lateral branches reduced to sharp spines and not yielding a fibre, but the leaves and fruit afford no distinctive character. A similar plant occurs at Delagoa Bay (*Forbes* in Herb. Kew.). This may be the plant described by Reichenbach as *Heteropterys macroptera*, referred to by A. de Jussieu, Monog. Malpigh. 227.

2. **S. Welwitschii,** *Oliv.* A large shrub often climbing to a great height, with smooth and glabrous branches. Leaves thinly coriaceous with curved looping lateral veins, broadly elliptical or varying from obovate- to ovate-elliptical, usually shortly and obtusely or acutely acuminate, cuneate broadly rounded or rarely subcordate at the base, glabrous, shining above, rather paler and somewhat opaque beneath, 2–4 in. long, 1–2¼ in. broad; petiole ¼ in. or less. Flowers white or sulphur-yellow or petals rose-coloured at the base, in axillary simple branched or fascicled racemes shorter than the leaves or in terminal pyramidal panicles consisting of alternate successively shorter spreading or ascending racemes. Bracts deciduous; pedicels filiform, ¼–⅓ in. long, spreading, Three outer sepals orbicular, $\frac{1}{12}$–$\frac{1}{10}$ in. Wing-sepals three to four times as long, orbicular, concave, white. Lateral petals oblong or obovate. Samara about 2 in. long, not much exceeding ½ in. in breadth above, gradually narrowed below.—*S. floribunda,* Welw. Apont. Phyto-geog. (non Benth.) 562.

Upper Guinea. Camaroons and Muni rivers, *Mann!*
Lower Guinea. Angola, prov. Golungo Alto, *Dr. Welwitsch!*
The inflorescence varies as in other lianes forming the flowering crown of forest trees.

3. CARPOLOBIA, G. Don; Benth. et Hook. f. Gen. Pl. i. 139.

Flowers irregular. Sepals 5, free; 2 inner usually distinctly larger. Petals 5, nearly equal, adnate below to the staminal sheath; median petal (keel) galeate. Stamens 5, monadelphous; the sheath open above, adnate to the petals; anthers 2-locular, dehiscing as in *Securidaca*. Ovary 3-celled, with one ovule in each cell; style incurved above. Fruit 3–2-lobed, 3 2-seeded, or globose and 1-seeded, more or less fleshy or pulpy when ripe, with a coriaceous epicarp. Seed with hairy testa, and copious fleshy albumen.—Evergreen shrubs, with alternate entire leaves. Flowers white and purple or yellowish, in short axillary racemes or fascicles.

I am by no means sure that the two forms described here as specifically distinct, might not more correctly be regarded as modifications of one species. The only important difference between them is in the relative size of the outer and inner sepals. The genus is confined to W. tropical Africa.

Innermost sepals twice as long as outermost . . . . . 1. *C. alba.*
Sepals subequal or innermost a little larger . . . . . 2. *C. lutea.*

1. **C. alba,** *Don, Gen. Syst.* i. 370. A small tree or shrub, attaining 8–10 ft. Branches shortly pubescent or puberulous. Leaves firmly membranous or subcoriaceous, oblong-elliptical or varying from oblanceolate to obovate-elliptical, with an acute or rather obtuse more or less abrupt acumen; base narrowed to the petiole or cuneate, glabrous or nearly so, usually 2–4 in. long, ¾–1½ in. wide; petiole about 1 line. Flowers white or petals purple- or violet-tipped, in axillary fascicles or very short racemes of 2 to 4 or solitary; pedicels 1–3 lines. Sepals more or less ovate obtuse or rather

acute, puberulous and ciliolate or glabrous; the inner, about ¼ in. long, considerably exceeding the exterior, sometimes 2–3 times as long. Petals 2–3 times longer than the inner sepals. Fruit yellow or scarlet, usually 3-gonous and 3-seeded or seeds fewer by abortion, edible.

Upper Guinea. Sierra Leone, *Don!* Senegambia, Fernando Po, *Mann!*
Lower Guinea. Angola, provs. Golungo Alto and Pungo Andongo, *Dr. Welwitsch!*

Var. *parvifolia.* Leaves smaller, 1–1½ in., ovate or ovate-lanceolate, obtuse, scarcely or not at all acuminate.—Old Calabar, *Mann! Thomson!*

2. **C. lutea,** *Don, l. c.* A small shrub, closely resembling *C. alba.* Leaves as in *C. alba.* Flowers in axillary fascicles of 2 or 3–6. Sepals ovate or ovate-lanceolate, subequal or inner rather larger, 2 lines or less. Petals white or pale yellow.

Upper Guinea. Sierra Leone, *Don!* Lagos, Abbeokuta, etc., Niger, *Barter!* Old Calabar, *Mann!*

C. versicolor and *C. dubia,* Don, l. c., belong to genera of *Leguminosæ,* as shown by Mr. Bentham (Fl. Nigrit. 224).

With the above species in the herbarium of the British Museum is a third plant, collected at Sierra Leone by Afzelius, which may be an undescribed *Carpolobia,* or perhaps a new generic type. I have not made an analysis of the flower. It has been written up as "*Diadelphia pentandria, baccata.*" It is wholly glabrous or the racemes obsoletely puberulous. Leaves coriaceous, elliptical, shortly acuminate or obtusely cuspidate, 2½–4 in. long, 1¼–2 in. broad, on petioles of ¼ in. Racemes axillary, 2 or 3 together, rarely once-branched, 6–10-flowered, 1–1½ in. long. Sepals very unequal, obtuse, the inner longer. If a *Carpolobia,* the specific name *Afzeliana* may be assigned to it.

Order XVI. FRANKENIACEÆ (by Prof. Oliver).

Flowers regular, hermaphrodite. Calyx gamosepalous, tubular, persistent, 4–6-toothed. Petals as many as calyx-teeth, free, clawed, with a lamelliform appendage on the inner side of the claw. Stamens usually 6, hypogynous, free or very shortly connate at base, rarely cohering above; filaments flattened or filiform; anthers 2-celled, didymous, dehiscing longitudinally. Ovary 1-celled, with 3 (2–4) parietal multiovulate placentas; style simple, filiform; stigmas 3 or as many as placentas. Capsule enclosed in the persistent calyx, dehiscing in as many valves as placentas. Seeds albuminous, with a straight axile embryo.—Much-branched herbs or small undershrubs, affecting maritime or saline localities. Leaves small opposite exstipulate, often fascicled. Flowers rose to purple, sessile and solitary in the numerous forks or fascicled in leafy heads or cymes.

An Order of one genus, like several other maritime genera of no marked affinity, widely spread over the world in suitable localities.

1. **FRANKENIA,** Linn.; Benth. et Hook. f. Gen. Pl. i. 141.

Characters and distribution of the Order.

1. **F. pulverulenta,** *Linn.; DC. Prod.* i. 349. A diffuse or procum-

bent, much-forking herb, a few inches in height, with opposite, obovate oval or rotundate, often fascicled leaves, usually mealy-puberulous or setulose-pubescent beneath, flattish or with the margins more or less recurved, narrowed into short ciliolate or nearly glabrous petioles, less than $\frac{1}{4}$ in. in length. Calyx tubular, with short acute teeth, equalling the leaves. Filaments membranous, dilated, tapering above and below.

Upper Guinea. Senegal, *Sieber !* and others.

A wide spread species of shores and salt-deserts, occurring in S. Europe, India, and at the Cape.

Order XVII. CARYOPHYLLACEÆ (by Prof. Oliver).

Flowers regular, hermaphrodite or rarely diclinous by abortion. Calyx polysepalous; sepals 4 or 5, imbricate, or gamosepalous, toothed. Petals as many as sepals or calyx-teeth, entire 2-fid or toothed, sessile or clawed, sometimes minute or 0. Stamens 8–10 or fewer, free or alternately adnate to the claw of the opposed petal. Ovary free, sessile or shortly stipitate, 1-celled or imperfectly divided at the base, with a free central or basal placenta; styles 2–5, free or connate, stigmatose above on the inner side; ovules indefinite or rarely definite. Fruit usually a dry capsule, dehiscing by teeth or valves. Seeds usually indefinite, with a mealy albumen and more or less curved peripherical or excentric embryo.—Annual or perennial herbs, often woody below. Leaves opposite, entire, exstipulate or stipules membranous. Flowers solitary or in forking or fascicled cymes.

A numerous Order in the north temperate zone and in arctic regions; very rare between the tropics, and generally confined to mountainous countries. But one genus, *Uebelinia*, is confined to tropical Africa.

Calyx gamosepalous.

Styles 2 . . . . . 1. Dianthus.
Styles 3 . . . . . 2. Silene.
Styles 5. Stamens 5 . . . . . 3. Uebelinia.

Calyx polysepalous.

Styles free.
  Stipules 0.
    Styles 5. Capsule tubular or ovoid-oblong, dehiscing by 10 teeth, exserted . . . . . 4. Cerastium.
    Styles 3. Petals 2-fid . . . . . 5. Stellaria.
    Styles 3. Petals entire . . . . . 6. Arenaria.
    Styles 4–6. Capsule dehiscing by as many valves as styles . . . 7. Sagina.
  Stipules minute, scarious.
    Styles and valves of capsule 3 . . . . . 8. Spergularia.
    Styles and valves of capsule 5 . . . . . Spergula, p. 143.
Styles connate below.
  Ovules 5–∞.
    Petals divided. Stipules minute . . . . . 9. Drymaria.
    Petals entire. Sepals keeled . . . . . 10. Polycarpon.
    Petals entire or nearly so. Sepals not keeled. Stipules scarious, usually conspicuous . . . . . 11. Polycarpæa.
  Ovules 2. Fruit-heads setose . . . . . 12. Sphærocoma.

1. **DIANTHUS**, Linn.; Benth. et Hook. f. Gen. Pl. i. 144.

Calyx tubular, 5-toothed, with two or more imbricate opposite bracts, sheathing the base. Petals 5, with long claws; limb entire, toothed or laciniate, not 2-fid nor provided with a transverse scale. Stamens 10. Styles 2. Capsule dehiscing by 4 teeth or valves.—Herbs, with narrow grass-like leaves. Flowers terminal, solitary or cymosely fascicled, usually rose or purple.

A considerable genus, principally European and Mediterranean, though represented by 8–10 species at the Cape, according to Dr. Sonder. The species are exceedingly difficult to determine and define. The two following I leave as I find them; they may or may not be identical with extratropical species.

Lower leaves densely tufted, spreading, 3–5 in. Flowers large.
Calyx-tube 1½–2 in. Claw of petals exceeding calyx . . . . . 1. *D. longiglumis.*
Lower leaves erect, under 3 in. Flowers ½–¾ in. Claw of petals equalling calyx . . . . . 2. *D. leptoloma.*

1. **D. longiglumis,** *Delile in Ann. Sc. Nat. Ser.* 2. xx. 89. Perennial, with a branching diffuse rootstock, bearing large, rather dense tufts of spreading, long, linear, grass-like leaves, gradually attenuate to a fine point and minutely scabrid-denticulate above. Flowering stems usually simple, 1-flowered, ascending; the leaves narrow, flat or involute. Flowers 1½ 2 in. diam. Calyx striate, 1½–2 in. long, with linear-lanceolate acute teeth; bracts ovate-lanceolate, with a long, narrow, but firm, acumen or cusp, half as long as the calyx or shorter. Petals cuneate, incise-dentate, with very long claws.—Rich. Fl. Abyss. t. 12.

Nile Land. Mountain precipices, Abyssinia, *Schimper!*

2. **D. leptoloma,** *Steud.; Rich. Fl. Abyss.* i. 42. Flowering stems erect or ascending from a branched rootstock, simple or 2–3 times forked, a few inches to a foot in height. Leaves rather rigid, erect, linear, acute, minutely serrulate. Flowers solitary, ½–¾ in. diam. Calyx striate, acutely toothed, ½–¾ in. in length; bracts about 4, inner cuspidate, about half as long as the calyx. Petals cuneate, acutely toothed.—*D. abyssinicus*, R. Br. in Salt, Abyss. App. 64.

Nile Land. Mountains of Abyssinia, *Schimper! Salt!*

2. **SILENE**, Linn.; Benth. and Hook. f. Gen. Pl. i. 147.

Calyx tubular or variously dilated, 5-toothed, ebracteate. Petals 5-clawed; limb entire or 2-fid, rarely laciniate, usually with 2 transverse scales at the base of the limb. Stamens 10. Ovary usually more or less stipitate, 1-celled or 3-celled at the base. Styles 3. Capsule dehiscing in 6 or 3 teeth or valves.—Herbs, various in habit, annual or perennial. Flowers in forking or unilateral cymes or solitary.

A large genus, chiefly European, Mediterranean, and temperate Asiatic, represented at the Cape by 10 or 12 species.

Flowers in loose forking paniculate cymes.
Glabrous or nearly so. Calyx elongate-tubular, 1–1½ in. . . . 1. *S. Macrosolen.*

Flowers in unilateral racemes or solitary.
Flowers 2–6; lowest pedicel about 1 in. Petals scarcely exserted, with fleshy 2-lobed appendix . . . . . 2. *S. Biafræ.*
Flowers usually 3–9; pedicels very short. Petals with claw equalling calyx and 2-fid appendix . . . . . 3. *S. Burchellii.*
Flowers usually solitary. Petals with claw equalling calyx; appendix obsolete . . . . . 4. *S. flammulæfolia.*

1. **S. Macrosolen,** *Steud.; Rich. Fl. Abyss.* i. 44. A glabrous, pale or somewhat glaucous perennial, branching from the stock; flowering-stems erect, simple or forking, apparently a little viscid above, 2–3 ft. high. Leaves narrow-linear, tapering to a fine point, with a prominent midrib beneath, scarcely $\frac{1}{6}$ in. in breadth. Flowers in a loose forking panicle. Calyx elongate, narrowly tubular, a little wider above, 1–1½ in. long; teeth short, ovate, cuspidate; nerves not prominent nor coloured. Petals considerably exserted (limb 2-fid with obtuse lobes, *Rich.*). Carpophore much exceeding the capsule.

Nile Land. Abyssinia, *Schimper!* and others.

2. **S. Biafræ,** *Hook. f. in Journ. Linn. Soc.* vii. 183. Flowering-stems erect, 1–3 ft., simple or slightly branched, pubescent. Leaves linear, rather fleshy; the upper very narrow, acute, scabrid-pubescent, 1–2 in. long. Flowers 2–6, not exceeding ¾ in. in length, erect, in unilateral cymose racemes; pedicels of the lowest flower about 1 in., of the upper much shorter. Calyx oblong-campanulate, with 10 dark, hispid-pubescent nervures; teeth triangular-lanceolate. Petals fleshy, about equalling the calyx; lamina 2-fid, with obtuse lobes; appendix 2-lobed, very short, fleshy. Carpophore about one-third the length of the capsule.

Upper Guinea. Camaroons mountain, 8000–10,000 ft., *Mann!*

3. **S. Burchellii,** *Otth. in DC. Prod.* i. 374. An erect, puberulous or scabrid-pubescent perennial of 1–2 ft., branching from a woody stock or occurring as an annual. Lower leaves linear-lanceolate to oval, narrowed below, usually acute, more or less scabrid-pubescent, ciliate below; upper leaves linear, tapering to each end, acute. Flowers usually 3–9, in erect, unilateral, spicate racemes, very shortly pedicellate or the upper subsessile. Calyx clavate, ½ ¾ in. long, with narrow-triangular acute teeth and more or less darkly coloured nervures. Claw of petals equalling calyx; limb rather thick, obtusely 2-fid, with 2 squamiform appendices. Carpophore about as long as the capsule.—*S. Oliveriana,* Otth. in DC. Prod. i. 373. *S. Chirensis,* Rich. Fl. Abyss. i. 44. *S. sericea,* Rich. l. c. 43.

Nile Land. Abyssinia, *Schimper! Roth! Parkyns!* and others; ? Nubia (*S. brachystachys,* Webb, Frag. Fl. Æthiop. 34), *Schweinf. et Asch. Enum.*

Also in Arabia, Syria, and at the Cape. (See 'Flora Capensis,' i. 128, for synonymy. *S. clandestina,* Jacq., is probably a variety.)

Very nearly allied to *S. imbricata* and *S. bipartita,* Desf. Fl. Atlant., although, after a comparison of specimens, I have not felt authorized to unite them nor to follow Richard in identifying an Abyssinian *Silene* with the *S. sericea* of Allioni. Between the *S. sericea,* Rich., and *S. chirensis,* Rich., I find no specific difference.

4. **S. flammulæfolia,** *Steud.; Rich. Fl. Abyss.* i. 43. A cæspitose

herb of ½–1 ft., giving off from the wiry, diffuse or prostrate stem ascending, simple, 1-flowered or slightly divided, pubescent branches. Lower leaves cæspitose, linear-spathulate, pointed, hispid-puberulous, ciliate below; upper pairs similar or much reduced, scarcely ¼ in. long. Flowers solitary or the stem loosely forked, bearing 2 or 3. Calyx clavate, about ½ in. long, glandular-pilose, with dark nervures; teeth triangular, rather obtuse. Petals exserted; claw equalling the calyx; limb elongate-cuneate, 2-fid, with linear obtuse lobes; appendix nearly obsolete. Carpophore shorter than the capsule.

Nile Land. Abyssinia, *Schimper!*

3. UEBELINIA, Hochst.; Benth. et Hook. f. Gen. Pl. i. 148.

Calyx campanulate, 10-nerved, 5-fid. Petals 5, shorter than the calyx, entire or nearly so, without a transverse scale. Stamens 5. Styles very short, 5. Capsule obovoid, dehiscing by 5 valves.—A more or less setulose-scabrid dichotomous herb. Leaves plane. Flowers in the forks.

A monotypic genus, peculiar to this Flora.

1. **U. abyssinica,** *Hochst. in Flora*, 1841, 664. Decumbent or ascending, 2–3 in. to 1 foot or more in height, repeatedly forked; the branches setulose-hispid, at least in lines. Leaves obovate-oblong, obtuse, mucronate, narrowed to the base, setulose-ciliate. Pedicels ½–1 in. or much shorter in the smaller specimens, at length often deflexed. Calyx setulose.—*U. spathulæfolia*, Hochst. in Pl. Schimp. Abyss.

Nile Land. Abyssinia, *Schimper!*

4. CERASTIUM, Linn.; Benth. et Hook. f. Gen. Pl. i. 148.

Sepals free, 5 or 4. Petals as many, notched or 2-fid, exunguiculate, sometimes minute. Stamens 10 or fewer. Styles usually 5 (4 or 3), opposite to the sepals. Capsule tubular to ovoid-oblong, opening at the apex in twice as many teeth as styles, usually exceeding the calyx.—Herbs often hairy, with plane, rarely subulate leaves, and forking, dense or lax, terminal cymes of white flowers.

A considerable genus of temperate, alpine, and arctic regions, including one or two species which are almost ubiquitous.

Hairy or pubescent. Capsule cylindrical, at length much exceeding calyx . . . . . 1. *C. vulgatum.*
Leaves thinly scabrid-hairy, very acute. Capsule oblong-ovoid, slightly exceeding calyx . . . . . 2. *C. africanum.*

1. **C. vulgatum,** *Linn.*; *DC. Prod.* i. 415. A glandular-pilose or softly hirsute, diffuse or ascending annual. Leaves oval or varying from subovate to oblong-lanceolate, sessile or narrowed into a rather broad petiole. Flowers on pedicels about equalling the calyx, from the upper forks, spreading or at length reflexed, crowded into a rather dense leafy cyme or in a loose dichotomous panicle. Sepals with a membranous margin. Petals shorter than or but

slightly exceeding the sepals, 2-fid or 0. Capsule cylindrical slightly curved above, exceeding the calyx more or less.—*C. simense*, Hochst. in Pl. Schimp. Abyss.

Upper Guinea. Camaroons mountain, *Mann !*
Nile Land Abyssinia, *Schimper !* and others.

C. octandra, Hochst.; Rich. Fl. Abyss. i. 45, is a tetramerous variety occurring in Abyssinia.

A cosmopolitan weed, apparently truly indigenous in tropical Africa, at least on high ground.

2. **C. africanum,** *Oliv.* A weak branching herb, attaining 1–2 ft., with slender internodes 1–2½ in. long, shortly glandular-pilose, especially above. Leaves membranous, plane, spreading, sessile, lanceolate, very acute, sparsely scabrid-pilose, ¾–1½ in. long. Flowers in small, terminal, few-flowered cymes, with the slender rather short pedicels, glandular-pilose. Sepals ovate-lanceolate, rather acute, shorter than the narrow oblanceolate very shortly 2-fid or nearly entire petals. Styles 5, very short. Capsule narrowly ovoid, straight, exceeding the calyx, opening at the apex in 10 very short teeth or 5 at length 2-fid. Cotyledons incumbent.—*Arenaria africana*, Hook. f. in Journ. Linn. Soc. vii. 184.

Upper Guinea. Camaroons mountain, 7000–10,000 ft., *Mann !*

5. **STELLARIA,** Linn.; Benth. et Hook. f. Gen. Pl. i. 149.

Sepals free, 5 (or 4). Petals as many, 2-fid or 2-partite. Stamens 10 or fewer. Styles usually 3. Capsule globose, oblong or ovoid, dehiscing in as many 2-fid valves as styles or twice as many and entire.—Diffuse herbs. Leaves plane, rarely subulate. Flowers white, usually in terminal dichotomous paniculate cymes.

A numerous and wide-spread genus, in temperate, arctic, and mountain regions. The only indigenous species known to me is endemic.

1. **S. Mannii,** *Hook. f. in Journ. Linn. Soc.* vii. 183. A weak, diffuse, slender, nearly glabrous herb, from a few inches to 1 or 2 ft.; branches ascending, sparingly setulose or glabrous. Leaves rather firmly membranous, ovate, very acute, entire or crisped, scabrid-punctate above, 1 in. long or less, ¼–½ in. broad, slender, on petioles of ¼–½ in. Flowers in small, few-flowered, divaricate, terminal panicles; pedicels and calyx minutely glandular-pubescent. Sepals linear-lanceolate, acute. Petals 2-fid; lobes narrow, acute, connivent, nearly equalling the sepals. Ovary globose, with 3–5 ovules.

Upper Guinea. Camaroons mountain, 7000 ft., *Mann !* St. Thomas, *Dr. Welwitsch !*

Dr. Hooker points out that this plant is nearly allied to Ceylon and Himalayan species.

In Dr. Schweinfurth's 'Flora Æthiopica' (p. 60), there is a notice of "*S. Brauniana*, Fenzl in litt." The name is applied to a well-marked plant, with the habit of *S. media*, collected by Schimper in Abyssinia. No description is given.

[*S. media*, L. An annual weed of cultivated ground, in every quarter of the world, probably originally dispersed from Europe, no doubt occurs in various localities within the limits of this flora. I have only seen tropical African specimens from Angola, where Dr. Welwitsch gathered it as a weed of cultivation. It differs from the preceding in its solitary pedicels from the forks of the leafy branches, the internodes of which are marked by a softly pubescent line, and other characters.]

6. ARENARIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 149.

Sepals 5 (rarely 4), free. Petals as many, entire or emarginate or 0. Stamens 10 (or 8). Ovary 1-celled; ovules indefinite; styles usually 3. Capsule globose to oblong-ovoid, dehiscing in as many or twice as many teeth or valves. Seeds globose or compressed, tubercled or smooth.—Annual or perennial herbs. Leaves subulate, rigid, slender or plane. Flowers cymose, usually white.

A large genus of the temperate and arctic zones and alpine regions between the tropics.

Leaves subulate. Capsule 3-valved . . . . . 1. *A. Schimperi.*
Leaves ovate. Capsule 6-valved or -toothed . . . . . 2. *A. serpyllifolia.*

1. **A.** (§ *Alsine*) **Schimperi,** *Hochst.; Rich. Fl. Abyss.* i. 47. A procumbent, diffuse or tufted perennial, with a branching woody stock; the flowering-stems erect or decumbent, 2 or 3 in. or more in height. Leaves finely subulate, spreading, about ¼–½ in. long, often appearing tufted from numerous axillary leaf-buds. Flowers in loose forking cymes; pedicels glabrous or puberulous. Calyx rather truncate at the base when dry; sepals lanceolate, acute, 3-nerved, equalling the oblong-lanceolate, obtuse, entire petals. Styles 3. Capsule dehiscing in 3 valves, rather shorter than the calyx.

Nile Land. Rocky and mountainous places, Abyssinia, *Schimper! Roth!* and others; Sennar? (var. *graminifolia*, Webb, Frag. Fl. Æthiop. 36).

2. **A. serpyllifolia,** *Linn.; DC. Prod.* i. 411. A weak erect or diffuse, much-branched, puberulous annual, from a few inches to 1 ft., supported by taller growths. Leaves ovate or rotundate, acute or apiculate, usually from 1–3 lines long. Capsule dehiscing by 6 valves or teeth, often unequally.

Nile Land. Abyssinia, *Schimper!* Nubia (*Schweinf. et Asch. Enum.*).
A common weed in Europe and temperate Asia.

7. SAGINA, Linn.; Benth. et Hook. f. Gen. Pl. i. 151.

Sepals 4–5–6. Petals as many entire, or 0. Stamens as many or twice as many or fewer by abortion. Ovary 1-celled; ovules indefinite. Styles as many as sepals and alternate with them. Capsule dehiscing to the base in as many valves as styles.—Low tufted or procumbent herbs with subulate leaves and small pedicellate flowers.

A small genus, chiefly confined to the cooler regions of the northern hemisphere.

1. **S. abyssinica,** *Hochst.; Rich. Fl. Abyss.* i. 47. A diffuse or sometimes, in exposed places, densely tufted, glabrous perennial, throwing up numerous, leafy flowering-stems, 1–6 in. long. Leaves subulate; the lower often densely tufted and sometimes growing out to 1½ in. Flowers alternate or cymosely fascicled on capillary pedicels. Calyx rather broadly rounded or subtruncate below; sepals 4–6, obtuse, exceeding the entire petals, erect or scarcely spreading after flowering.

Upper Guinea. Fernando Po, 8500 ft., and Camaroons mountain, 9000–11,000 ft., *Mann !*

Nile Land. Abyssinia, *Schimper !*

Peculiar to tropical Africa.

8. **SPERGULARIA**, Pers.; Benth. et Hook. f. Gen. Pl. i. 152.

Sepals 5, free. Petals 5, entire, rarely fewer or 0. Stamens 10 or fewer. Ovary 1-celled, multiovulate; styles 3. Capsule dehiscing in 3 valves. Seeds subglobose, compressed or winged.—Low, spreading or forking herbs, with narrow, subulate or setaceous leaves and scarious stipules. Flowers pedicellate, white or rose, in racemose cymes.

A small genus, affecting the shores and saline deserts of temperate regions.

1. **S. rubra,** *Pers. Syn. Pl.* i. 504. *var.* A decumbent or ascending, much-branched annual or biennial herb, attaining 3–6 in. in height, more or less glandular-pubescent above, at least on the pedicels and calyx. Leaves very narrow-linear, rather fleshy, often with tufted secondary leaves in their axils; stipules minute, scarious. Flowers white or pink, in forked or racemose cymes; pedicels reflexed or spreading after flowering. Sepals oblong or lanceolate, rather obtuse, exceeding the petals. Capsule slightly exceeding or equalling the calyx. Seeds compressed (not winged in the specimens which I have seen, which agree, as noted by Planchon, with those of the *S. salsuginea*, Bunge, figured in Ledebour's Atlas with yellowish flowers, by mistake).

Nile Land. Abyssinia, *Schimper !*

Dr. Ascherson distinguishes four species in Abyssinia, descriptions of which I have not seen. *Spergularia rubra* has a wide distribution in both hemispheres.

[*Spergula arvensis*, Linn. A slender annual, ½–2 ft. in height, with apparently verticillate, narrow-linear or subulate leaves, 1–2 in. long, and terminal di-trichotomous cymes of small white flowers, with the pedicels usually deflexed in fruit, is widely spread as a weed of cultivation. Dr. Welwitsch collected it amongst Flax in Angola, and Dr. Schimper abundantly amongst corn in Abyssinia.]

9. **DRYMARIA,** Willd.; Benth. et Hook. f. Gen. Pl. i. 152.

Sepals 5, free. Petals 5, divided. Stamens 5 or fewer by abortion, slightly perigynous or inserted in a short annular disk. Ovary 1-celled, 2 ∞-ovulate. Styles 3, connate below. Capsule 3-valved.—Diffuse forking herbs. Leaves plane, with minute stipules. Flowers small, cymose.

Principally an American genus, of which the following species has the widest distribution.

1. **D. cordata,** *Willd.; DC. Prod.* i. 395. A weak spreading herb, glabrous or nearly so, often extending 2 or 3 ft. Leaves broadly ovate, subcordate or nearly orbicular, mucronulate, 3-nerved, shortly petiolate, ½–1 in. long. Flowers small, in terminal or axillary, few-flowered, often loose, cymose panicles on slender glabrous or minutely glandular peduncles. Petals 2 fid, shorter than the sepals.

Upper Guinea. Camaroons mountain, 7000 ft., and Fernando Po, 1000 ft., *Mann !*

Lower Guinea. Golungo Alto, Angola, *Dr. Welwitsch !*

The only African localities known to me for this weed, widely dispersed through the tropics of both Asia and the New World. It is likely to occur in Abyssinia.

10. **POLYCARPON**, Linn.; Benth. et Hook. f. Gen. Pl. i. 152.

Sepals 5, free, membranous or scarious, with a strong herbaceous keel. Petals 5, shorter than the sepals, entire or emarginate. Stamens 5–3. Ovary 1-celled, multiovulate; style short, 3-fid. Capsule 3-valved. Embryo curved or nearly straight.—Diffuse forking herbs, with opposite leaves, usually in pseudo-verticils of 4, with scarious stipules. Flowers small, in terminal cymes.

A small widely-spread genus in temperate and tropical countries.

Sepals strongly keeled, apiculate. Seeds and embryo distinctly curved . . . . . 1. *P. tetraphyllum.*
Sepals keeled, obtuse or scarcely apiculate. Seeds cylindric-oblong; embryo nearly straight . . . . . 2. *P. Lœflingii.*

1. **P. tetraphyllum,** *Linn. f.; DC. Prod.* iii. 376. A glabrous, diffuse, forking, erect or procumbent herb of 3 or 4 in. Leaves obovate oblanceolate or oval, obtuse or scarcely acute, narrowed into the petiole, $\frac{1}{4}$–$\frac{1}{2}$ in. long, two pairs usually approximated so as to appear in whorls of 4. Flowers very small, in dense or loose terminal cymes. Sepals strongly keeled and boat-shaped, acutely apiculate. Seeds curved on one edge, with a distinctly curved embryo.

Nile Land. Abyssinia, *Schimper! Dillon.*

Occurs at the Cape, and generally in sandy or maritime situations, in the warmer parts of both hemispheres (tropical Asia excepted, *Bentham*).

2. **P. Lœflingii,** *Benth. et Hook. Gen. Pl.* i. 153 (*in note*). Similar in habit to the above, usually larger, 6–8 in., tomentose-pubescent or glabrous. Leaves from oblanceolate to nearly linear, rather acute or obtuse, usually from $\frac{1}{4}$–$\frac{3}{4}$ in. Flowers in paniculate cymose fascicles. Sepals with a strong linear herbaceous more or less obtuse keel, rather unequal. Petals notched or entire. Seeds shortly cylindrical, with the hilum lateral near one end, and a nearly straight embryo. For synonymy, see Walpers, Rep. i. 263.—*Arversia depressa*, Kl. in Peters' Mossamb. Bot. 140.

Upper Guinea. Niger, *Barter!*
Nile Land. Nubia, *Bromfield!* Kordofan and Sennar (*Webb, Frag. Fl. Æthiop.*).
Lower Guinea. Angola, *Dr. Welwitsch!* Congo, *Smith!*
Mozamb. Distr. Zambesi, *Dr. Peters.*

Occurs in northern Africa and India.

Were it not that Nuttall has applied the specific name *depressum* to another species, it ought, being as I suppose the oldest, to have been retained here. *Polycarpæa memphitica*, Del. Fl. Ægypt. Atl. t. 24. f. 2, appears to be the same plant.

Polycarpæa mozambica, Kunth et Bouché (Ind. Sem. Berol. 1848), I do not know. It may be a glabrous form of the above.

11. **POLYCARPÆA**, Lam.; Benth. et Hook. f. Gen. Pl. i. 154.

Sepals 5, free, scarious, not keeled. Petals as many, entire or toothed, shorter than the sepals. Stamens 5, hypogynous or slightly perigynous, free or connate at the base. Ovary 1-celled, with few or many ovules; style short (in tropical African species) or elongate; stigma 3-lobed or nearly entire and capitate. Capsule 3-valved. Embryo usually curved.—Erect or diffuse, dichotomous herbs. Leaves usually linear or lanceolate, often fascicled, form-

ing pseudo-verticils. Stipules scarious. Flowers in diffuse or compact, panicled corymbose or solitary cymes, with scarious, silvery, sometimes rose or purple flowers.

A considerable genus of the warmer parts of both hemispheres. One of the following species has a wide extra-African range. The species are very difficult to define. I have bestowed considerable time upon the tropical African species, and yet must regard them as treated provisionally.

Sepals lanceolate, very acute. Leaves narrow-linear or linear-subulate.
- Flowers in distinct and loosely panicled or confluent spreading cymes. 2–3 in. to 1 ft. . . . . 1. *P. corymbosa.*
- Flowers in small, 10–14-flowered, capitate, divaricate cymes . . . 2. *P. stellata.*
- Flowers in dense, hemispherical or globose, solitary or loosely panicled, many-flowered heads, ½–1 in. diam. 1–3 ft. . . . . 3. *P. linearifolia.*

Sepals ovate, acute. Leaves linear-lanceolate, subacute. Flowers in dense, many-flowered capitate cymes ½–1 in. or more in diam. . . 4. *P. glabrifolia.*

Sepals ovate-elliptical, apiculate, centre thickly herbaceous. Leaves linear-lanceolate, revolute, mucronate. Flowers fascicled. Hoary . 5. *P. fragilis.*

Sepals ovate-lanceolate. Leaves oblanceolate-spathulate, rosulate.
- Flowers densely fascicled. Glabrous . . . . . 6. *P. spicata.*

Sepals ovate-lanceolate; inner slightly longer and obtuse; centre herbaceous. Leaves linear or spathulate. Flowers single. Glabrous . 7. *P. prostrata.*

1. **P. corymbosa,** *Lam.*; *DC. Prod.* iii. 374. An erect or decumbent herb, 2 or 3 in. to 1 ft. high, often diffuse. Stems hoary-tomentose-pubescent (sometimes thinly), repeatedly and often densely forked. Leaves narrow-linear or linear-subulate with axillary tufts, forming pseudo-verticils, pubescent or glabrous, much exceeding the lanceolate or subulate, finely-pointed, scarious stipules; ⅛–1 in. long or longer. Flowers erect, in terminal dense or rather lax, silvery, many-flowered cymes, in the much-branched forms confluent, so as almost to hide the plant. Sepals scarious, sometimes coloured below on the median line, lanceolate, very acute, glabrous or pilose, much exceeding the petals which vary from one-third to two-thirds the length of the sepals. Capsule one-half to two-thirds as long as the sepals.—*P. tennifolia*, DC. l. c.? *P. eriantha*, Hochst.; Rich. Fl. Abyss. i. 303. *P. fallax* and *P. humifusa*, J. Gay, mss. in Herb. Kew.

Upper Guinea. Senegambia!
Nile Land. Kordofan, *Kotschy!* Sennar, *Husson*; Bahr-el-Abiad (*Schweinf. et Asch. Enum.*)
Lower Guinea. Huilla, Angola, *Dr. Welwitsch!*
South Central. Lat. 23° S., *Chapman and Baines!*
Mozamb. Distr. Zambesi, *Dr. Kirk!*

Var. *effusa*. Cymes confluent. Niger, *Barter!* Madi, *Speke and Grant!* Huilla, Angola, *Dr. Welwitsch* Zambesi, *Dr. Kirk!*

Var. *parviflora*. Erect, slender. Flowers smaller, golden-brown. Ionaula, Angola, *Dr. Welwitsch!* Perhaps a distinct species.

Occurs at the Cape, also in India, Australia, and the New World.

2. **P. stellata,** *DC. Prod.* iii. 374. An erect or diffuse herb, sometimes repeatedly forked from the base, sometimes with numerous, erect, slender branches given off above. Stem shortly tomentose-pubescent. Leaves spreading, narrow-linear or linear-lanceolate, glabrous or pubescent, usually with axillary leafy tufts. Stipules lanceolate or ovate-lanceolate, finely pointed. Flowers in rather compact, small, capitate, about 10–12-flowered

cymes, on widely divaricate, branching peduncles or singly terminating the slender branches in the simpler forms. Sepals very acute, about twice as long as the capsule, two to four times longer than the petals.—*Mollia stellata*, Willd.; Schum. et Thonn. Guin. Pl. 136.

Upper Guinea. Niger, *T. Vogel! Ansell!*

3. **P. linearifolia,** *DC. Prod.* iii. 374. An erect herb or decumbent at the base with erect, hoary-tomentose, more or less forked branches, from about 1–3 ft. in height. Leaves in pairs or pseudo-verticils, linear or linear-subulate, glabrous or thinly pilose with long subulate scarious stipules. Flowers in dense, hemispherical or subglobose, many-flowered, solitary or loosely-panicled heads terminating the erect branches, ½–1 in. diam. Sepals lanceolate, very acute, considerably exceeding the petals and 2–many-seeded capsule.—DC. Mém. Paronyc. t. 6.

Upper Guinea. Senegambia, *Sieber! Bidjem!* Niger, *T. Vogel!* and others.
Nile Land. Abyssinia, *Schimper!* Kordofan, *Kotschy*; Bahr-el-Abiad (*Schweinf. et Asch. Enum.*).
Lower Guinea. Pungo Andongo, *Dr. Welwitsch!*
Perhaps a congested variety of *P. corymbosa.*

4. **P. glabrifolia,** *DC. Prod.* iii. 374. An ascending or erect herb with a tomentose or at length glabrate more or less branched stem. Leaves crowded or in rather remote pairs, linear-lanceolate, subacute or rather obtuse, somewhat 3-nerved, glabrous, with silvery, ovate-lanceolate, finely-pointed stipules. Flowers in compact, terminal, roundish, capitate, many-flowered cymes, solitary, or 2 or 3 together in our specimens. Sepals ovate, acute, but not narrowed to a fine point as in the other tropical African species, considerably exceeding the capsule.—DC. Mém. Paronyc. t. 5.

Upper Guinea. Sierra Leone, *Don!* Grand Bassa, *T. Vogel!* Senegal.
Nile Land. Kordofan, *Kotschy* (*Webb, Frag. Fl. Æth.*).

5. **P. fragilis,** *Delile; DC. Prod.* iii. 374. Hoary-puberulous or -tomentose herb of ¼–1 ft. with numerous spreading branches usually from a woody nodose stock; lateral branches usually short. Leaves linear-lanceolate with revolute margins, conspicuously mucronate, hoary or tomentose. Stipules silvery, membranous. Flowers in small, rather densely fascicled cymes either terminal or lateral on the very short lateral branchlets. Sepals ovate-elliptical, apiculate, rather thick and herbaceous with a broadly membranous margin, exceeding the petals.

Nile Land. Nubia (*Schweinf. et Asch. Enum.*).
Also in Egypt and Arabia.

6. **P. spicata,** *Arnott in Ann. Nat. Hist.* iii. (1839) 91. A glabrous herb of 2–6 in. with straight spreading branches from the rosulate radical leaves, each bearing a leafy tuft and umbellate peduncles terminating in dense little fascicles of flowers, or, in small specimens, a single tuft of flowers after 1 or 2 pairs of reduced leaves. Leaves oblanceolate-spathulate, acute or obtuse. Sepals scarious, ovate-lanceolate to lanceolate with a narrow coloured median portion. Petals much shorter than the sepals, oblong, minutely erose or emarginate.—*P. staticæformis*, Hochst. et Steud.; Webb, Frag. Fl. Æth. 40.

Nile Land. Abyssinia (*Schweinf. et Asch. Enum.*).
Also in Egypt, Arabia, and India.

7. **P. prostrata,** *Decaisne in Ann. Sc. Nat. Ser.* 2. iii. 263. A diffuse, glabrous, rather glaucous herb of 3–8 in., the lateral branches spreading or prostrate, repeatedly and rather laxly forking from the base. Leaves narrowly linear-spathulate or the upper linear, subacute or rather obtuse. Stipular scales inconspicuous, very minute. Flowers singly from the forks or subfastigiate towards the extremities; lower pedicels usually exceeding or equalling the flower. Sepals ovate-lanceolate, herbaceous, with a broad membranous margin, the inner slightly longer. Petals nearly equalling the sepals, ovate-elliptical, obtuse, entire, very shortly unguiculate.—*Arenaria? prostrata*, Ser., DC. Prod. i. 400. *Robbairea prostrata*, Boiss. Fl. Orient. i. 135.

Nile Land. Nubia (*Schweinf. et Asch. Enum.*).
I have not myself seen specimens collected south of the tropic.
Also in Egypt and Arabia.

12. **SPHÆROCOMA,** T. Anderson; Benth. et Hook. f. Gen. Pl. i. 154.

Sepals 5, strongly mucronate, serrulate. Petals 5, entire, shorter than sepals. Stamens 5, inserted on a small annular disk. Ovary 1-celled, biovulate; style bifid. Utricle indehiscent, 1-seeded.—A much-branched, glabrous, glaucous shrub of 1–2 ft. Leaves fleshy, terete, fascicled. Flowers in pedunculate globose glomerules, densely setigerous from the accrescent sepals of the abortive flowers.

Based upon Arabian specimens of the following species:—

1. **S. Hookeri,** T. Anders. in Journ. Linn. Soc. v. 16. t. 3.

Nile Land. Nubia (*Schweinf. et Asch. Enum.*).

Order XVIII. PORTULACEÆ (by Prof. Oliver).

Flowers regular, hermaphrodite. Sepals fewer than the petals, 2 in tropical African species, free or adnate to the base of the ovary, imbricate, deciduous or persistent. Petals 4–5, rarely more, hypogynous or perigynous, free or connate at the base, imbricate, usually fugacious. Stamens inserted with the petals, definite or indefinite. Filaments filiform; anthers 2-celled. Ovary free or half-inferior, uniloçular. Style 2–8-fid, the divisions longitudinally stigmatose; ovules 2 or indefinite, from the base of the cavity or from a free central column. Capsule membranous or crustaceous, dehiscing in as many valves as styles or transversely, rarely indehiscent. Seeds 1 or more, usually with a curved embryo surrounding a mealy albumen.—Herbs or shrubs, usually more or less succulent and glabrous. Leaves alternate or opposite, entire, often succulent, with scarious or setose stipular appendices. Flowers solitary or capitate and terminal, racemose or cymosely panicled, occasionally axillary.

A rather small Natural Order, chiefly American, with several genera represented in the Old World and two peculiar to the Cape Flora.

Ovary half-inferior. Flowers terminal solitary or fascicled . . . . . 1. Portulaca.
Ovary free. Flowers racemose or panicled . . . . . 2. Talinum.

1. **PORTULACA,** Linn.; Benth. et Hook. f. Gen. Pl. i. 156.

Sepals 2, deciduous. Petals 4–6, perigynous, free or united. Stamens 4–8 or more, perigynous or epipetalous. Ovary half-inferior, multiovulate. Style 2–3–8-fid. Capsule membranous or rather crustaceous, half-inferior, with circumscissile dehiscence. Seeds reniform, compressed or subglobose, granulate or smooth.—Fleshy spreading or erect herbs. Leaves alternate, subopposite or opposite, often whorled around the flowers, with squamiform or setose stipular appendages, plane or terete. Flowers terminal, solitary or fascicled, sessile or pedicellate, yellow purple or red, rarely whitish.

Principally a tropical American genus with one or two species widely spread in both hemispheres in waste and sandy places and a few peculiar to Australia or Africa. Two of the new species discovered in Angola by Dr. Welwitsch are remarkable in this exceptional genus in the extent to which their petals are connate and in their definite stamens and 2-fid style.

Petals free or nearly so. Stamens 8 or more.
- Leaves plane, oblanceolate, very obtuse. Stipules minute or obsolete. Floral squamæ ovate . . . . . 1. *P. oleracea.*
- Leaves terete. Stipules minute, pilose. Flower-heads with numerous setæ . . . . . 2. *P. foliosa.*
- Leaves plane lanceolate or oblong-spathulate, rather acute. Joints and flower-heads with numerous long setæ . . . . . 3. *P. quadrifida.*

Petals united more or less into a tubular or campanulate corolla. Stamens 4, alternate with the corolla-lobes. Style 2-fid. (Herbs of 1–3 inches.)
- Closely leafy, villous at nodes. Flowers in heads . . . . . 4. *P. saxifragoides.*
- Leaves spreading, oval; naked at the axils. Flowers in forking cymes . . . . . 5. *P. sedoides.*

1. **P. oleracea,** *Linn.; DC. Prod.* iii. 353. An annual herb with spreading or prostrate succulent branches. Leaves fleshy, alternate or subopposite, plane, oblanceolate or obovate-oblong, very obtuse, usually ¼–1½ in. in length. Stipules minute or obsolete. Flowers small, yellow, in terminal, sessile, few-flowered, solitary or loosely and cymosely panicled heads, surrounded by a few membranous, ovate, acute squamæ, and 2 or more involucral leaves. Petals 5. Styles 5–6-fid. Seeds granulate.

Upper Guinea. Fernando Po and Niger, *T. Vogel! Barter!*
Nile Land. Abyssinia, *Petit;* White Nile, *Petherick!* Unyoro, *Speke and Grant!*
Lower Guinea. Angola, *Dr. Welwitsch!*
Generally very common in sandy situations in warm climates all round the globe. The well-known salad and pot-herb Purslane.

2. **P. foliosa,** *Ker; DC. Prod.* iii. 353. Decumbent or erect, woody below with more or less succulent leafy shoots and elongate peduncles. Leaves alternate, fleshy, terete, ¼–1 in. long with setose stipular appendages generally inconspicuous. Flowers yellow, in few-flowered heads or solitary, terminal or overtopped by lateral shoots from immediately below the flowers, surrounded by a tuft of setæ and 4 or more involucral leaves. Seeds granulate.—Bot. Reg. t. 793. *P. prolifera,* Schum. et Thonn. Guin. Pl. 239 (*ex descr.*).

Upper Guinea. Niger, *T. Vogel! Barter!* Accra, *Don.*
Lower Guinea. Pungo Andongo and Loanda, *Dr. Welwitsch!*
Mozamb. Distr. Zambesi, *Dr. Kirk!*

3. **P. quadrifida,** *Linn.; DC. Prod.* iii. 354. A prostrate and rooting or decumbent annual, conspicuously woolly at the joints. Leaves plane, fleshy, lanceolate or linear-lanceolate, usually rather acute, ¼–½ in. long with long and numerous stipular setæ. Flowers sessile, terminal, surrounded by an involucre of 4 or more leaves and numerous lanate setæ. Petals 4, yellow, rarely rose or purple. Seeds tubercled.—*P. anceps*, Rich. Fl. Abyss. i. 301. (*? P. rediviva*, Wawra and Peyritsch, Sert. Beng. 24.)

Upper Guinea. Confluence of Niger and Quorra, *Barter!*
Nile Land. Abyssinia, *Petit.*
Lower Guinea. Loanda (and Mossamedes?), Angola, *Dr. Welwitsch!*
Also an Indian plant. Dr. Welwitsch describes the stamens 12 in number with pilose filaments, and the style 4-cleft with patent or recurved segments. Wawra and Peyritsch describe their plant as with axillary flowers.

4. **P. saxifragoides,** *Welw. mss.* A low herb of 1–3 in. with spreading or ascending, rather closely leafy branches, densely villous at the nodes, annual (or from a rhizome of several years' duration?). Leaves fleshy, opposite, ovate, plano-convex, rather obtuse, sessile, 1–1½ lines long. Flowers whitish, in terminal involucrate heads. Sepals free above, about one-third the length of the petals which are 4 in number united below into a tubular-campanulate corolla. Stamens 4, alternate with the petals. Style filiform, 2-fid. Capsules opening with a conical operculum, shining, few-seeded. Seeds compressed, shining, punctate.

Lower Guinea. Elevated rocky tracts, Pungo Andongo, Angola, *Dr. Welwitsch!*
The above details are derived from Dr. Welwitsch's memoranda.

5. **P. sedoides,** *Welw. mss.* A succulent erect or diffuse di-trichotomous glabrous herb of 1–2 in., rose-purple or green, naked at the nodes. Leaves opposite, fleshy, lanceolate or oval, 2–4 lines long. Flowers rose, sessile, in forking leafy cymes. Corolla tubular with a 4-fid limb. Stamens 4, alternate with the lobes of the corolla, epipetalous; anthers oblong. Style filiform, 2-fid. Capsule membranous, subdepressed, 3–7-seeded. Seeds subglobose.

Lower Guinea. Pungo Andongo, Angola, *Dr. Welwitsch!*

2. TALINUM, Adans.; Benth. et Hook. f. Gen. Pl. i. 157.

Sepals 2, deciduous or subpersistent. Petals 5, hypogynous. Stamens indefinite, hypogynous or adherent to the base of the petals. Ovary superior, multiovulate. Style 3-fid. Capsule globose or ovoid, papery or thinly crustaceous, dehiscing in 2–3 valves. Seeds compressed or subglobose, shining or radiate-striate.—Succulent glabrous herbs or shrubs. Leaves plane, alternate or subopposite. Stipules 0. Flowers racemose or paniculate, rarely solitary.

A small genus, principally American, confined to warm climates. One species is peculiar to the Cape flora.

Inflorescence racemose or paniculate.

Leaves elliptic- or oblanceolate-oblong, obtuse, emarginate. Flowers in a loose, forking, few-flowered panicle . . . . . 1. *T. crassifolium*

Leaves obovate-cuneate, very obtuse, entire, apiculate. Flowers in elongate racemes or racemose panicles . . . . . 2. *T. cuneifolium.*

Flowers axillary, solitary, or peduncles 2-flowered.

Branches spreading, leafy. Leaves lanceolate to linear . . . . 3. *T. Caffrum.*

1. **T. crassifolium,** *Willd.; DC. Prod.* iii. 357. Woody below, with succulent, erect, leafy, glabrous branches. Leaves fleshy, oblong-elliptical or oblanceolate-oblong, narrowed below into the petiole, obtuse, entire or emarginate and mucronulate, 2–3 in. long, ½–1¼ in. broad. Flowers red, in loosely forked, terminal, few-flowered, cymose panicles. Bracts minute, lanceolate or subulate. Sepals ovate acute or acuminate. Stamens indefinite. Seeds compressed with radiate striæ.

Upper Guinea. Niger, *T. Vogel!* (cultivated ground about towns) *Barter!*
Also in South America and the West Indies. Dr. Grisebach unites *T. crassifolium* and *T. triangulare*, Willd. (Fl. Brit. W. Indies, 56).

2. **T. cuneifolium,** *Willd.; DC. Prod.* iii. 357. A glabrous shrub attaining several feet with erect rod-like branches, leafy below and terminating in long racemes or racemose panicles of purple flowers. Leaves fleshy, alternate, obovate- or oblanceolate-cuneate or rotundate, narrowed into the petiole, rounded above, entire, mucronate or apiculate, 1–2 in. long, ½–1 in. broad. Raceme erect with scattered, 1–4-flowered, usually curved peduncles much longer than the oval deciduous bracts, ⅓–½ in. long. Sepals ovate-rotundate, somewhat apiculate. Anther-cells free except at attachment. Capsule globose, about the size of a pea, crustaceous. Seeds with radiate striæ.

Upper Guinea, Senegal!
Nile Land. Abyssinia, *Schimper!* Unyoro, *Speke and Grant!*
Lower Guinea. Loanda, Angola, *Dr. Welwitsch!*
Mozamb. Distr. Zambesi, *Dr. Kirk!*
Originally described from Arabian specimens by Forskäl. Nearly allied to, if not identical with *T. indicum*, W. et A., in the Indian specimens of which, however, the inflorescence is more panicled.

3. **T. Caffrum,** *E. and Z.; Sond. in Fl. Capensis*, ii. 385. A succulent leafy biennial or perennial herb from a thick, often several-headed root-stock with spreading or subpatent glabrous branches. Leaves fleshy, lanceolate, elliptic-lanceolate to oval or nearly linear, acute or subacute, mucronate, 1–1½ in. long, ¼–½ in. broad; petiole 1–2 lines or shorter. Flowers yellow or sulphur, axillary, solitary; peduncles exceeding or shorter than the leaves with one or more pair of subulate bracts, occasionally 2- or even 3-flowered, decurved above in fruit. For synonymy, see 'Flora Capensis,' ii. 385.

Lower Guinea. Loanda, Angola, *Dr. Welwitsch!*

Order XIX. TAMARISCINEÆ (by Prof. Oliver).

Tribe Tamarisceæ.

Flowers small, regular, usually hermaphrodite. Sepals 5 (4–6), free, im-

bricate. Petals as many, free or slightly connate at the base. Stamens 5–10, free, inserted into a small, annular, hypogynous disk or connate at the base, forming a ring around the base of the ovary (or monadelphous in an extra-tropical African genus); anthers bilocular, dehiscing longitudinally. Ovary free, 1-celled, with as many multiovulate placentas from the base of the cavity as styles; stigmas 3–4. Seeds with a sessile or stipitate crest of long hairs, exalbuminous.—Mostly bushes or small trees with minute or squamiform leaves. Flowers white or rose, spicate or in crowded racemes, often panicled.

The principal Tribe of a small Order, most numerous around the Mediterranean and in temperate Asia.

1. TAMARIX, Linn.; Benth. et Hook. f. Gen. Pl. i. 160.

Characters of the Tribe; differing from *Myricaria*, the only other genus which it contains, principally in the stamens, which are free or connate at the base into a minute ring merely. Neither of the following are peculiar to this Flora.

Branchlets not articulated. Leaves subulate, acute, ½–2 lines. Racemes usually crowded	1. *T. gallica.*
Branchlets apparently articulated. Leaves reduced to the sheath and oblique point. Racemes usually interrupted	2. *T. articulata.*

1. **T. gallica,** *Linn.; DC. Prod.* iii. 96. A bush or small tree with slender erect or somewhat pendulous branches. Leaves subulate, acute, from a triangular amplexicaul base, rarely over 2 lines long, usually much shorter. Flowers very numerous, crowded in slender lateral and terminal spicate racemes forming large paniculate masses of flower. Pedicels equalling or shorter than the calyx, from a scale-like bract. Sepals ovate-deltoid, entire or minutely denticulate, much shorter than the free petals. Styles 3, articulated at the division; lobes at length divergent.—*T. indica,* Willd.; DC. l. c. *T. senegalensis,* DC. l. c. *T. nilotica,* Ehrenb. in Linnæa, ii. 269.

Upper Guinea. Senegambia, *Leprieur and Perrottet, Bidjem!* and others.
Nile Land. Abyssinia, *Schimper!* and others. Nile, lat. 16° N., *Speke and Grant!*
Grows also in the Atlantic islands, around the Mediterranean, and eastward to India.

2. **T. articulata,** *Vahl; DC. Prod.* iii. 96. A bush or small tree, the slender ultimate branchlets usually hoary with a saline efflorescence from the impressed-punctate glands, and closely jointed, each article oblique and apiculate above, the leaves being reduced to their sheathing base, the free part to a minute triangular tooth. Flowers in spicate usually interrupted racemes, often less crowded than in *T. gallica*, but various.

Nile Land. Nubia (*Schweinf. et Asch. Enum.*).
Lower Guinea. Mossamedes and Bumba, Angola, *Dr. Welwitsch!*
South Central, 23° S. lat., *Chapman and Baines!*
Occurs south of the Tropic, also in North Africa and eastward to India.

ORDER XX. ELATINEÆ (by Prof. Oliver).

Flowers regular, hermaphrodite. Sepals 2–5, free, imbricate. Petals as

many, hypogynous, imbricate. Stamens as many or twice as many as petals, hypogynous, free; anthers 2-celled, dehiscing longitudinally. Ovary superior, with as many cells as sepals; styles as many. Ovules indefinite, axile. Capsule membranous or crustaceous, dehiscing by the septa into as many valves as cells, which separate from the axile column of the ovary with or without portions of the ruptured septa. Seeds straight or curved; albumen 0 or very thin. Embryo with short cotyledons.—Herbs or undershrubs, prostrate diffuse or aquatic. Leaves opposite or verticillate, entire or serrate, stipulate. Flowers small, axillary.

A small Order of two genera, both widely spread in the warmer parts of the Old and New World, though but one is represented in tropical Africa.

1. BERGIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 163.

Sepals usually 5, with an herbaceous midrib and membranous margins, more or less acute or apiculate. Capsule rather crustaceous; valves with their margins incurved or plane.—Herbs or shrubs, prostrate or diffuse, hispid pubescent or glabrous. Leaves opposite, serrate or entire. Flowers solitary or fasciculate, axillary.

A small genus, widely dispersed in warm countries. None of the species are peculiar to intertropical Africa.

Glabrous herb. Leaves oval. Flowers 1–2 lines. Stamens 10 . .	1. *B. verticillata.*
Annual herb. Leaves oblanceolate or elliptical to linear-oval, thinly hispid or glabrate. Flowers 1 line or less, in dense verticillasters. Stamens normally 5	2. *B. ammanoides.*
Annual herb. Leaves oval-oblong, acute, glabrous. Flowers 2–3 lines, solitary or geminate, on slender pedicels. Stamens 10 . .	3. *B. polyantha.*
Procumbent or ascending, from a woody stock. Leaves linear to linear-lanceolate, glabrous. Flowers 1–2 lines. Stamens 10 . .	4. *B. decumbens.*
Shrubby, at least below. Leaves oval to broadly elliptical, rather thick, shortly hispid. Flowers about 2 lines long. Stamens 10 .	5. *B. suffruticosa.*

1. **B. verticillata,** *Willd.; DC. Prod.* i. 390. Glabrous herb, ½–1 ft., usually with procumbent branches rooting at the nodes. Leaves oval, narrowed to each end, subacute or rather obtuse, finely or obscurely serrulate, membranous or rather succulent, glabrous; venation obscure, 1–2 in. long, ¼–⅔ in. broad; petiole gradually dilating upwards, 1–3 lines; stipules lanceolate-deltoid, 1–2 lines. Flowers in sessile or subsessile, few- or many-flowered axillary clusters. Sepals lanceolate to ovate-lanceolate, obliquely mucronulate. Petals oval-oblong, equalling or exceeding the sepals. Stamens 10; filaments narrow-linear or subulate, subequal. Ovary globose or ovoid-globose; styles very short.

Nile Land. Kordofan (*Schweinf. et Asch. Enum.*).
Also in Egypt and widely dispersed in the tropics of both hemispheres.

2. **B. ammanoides,** *Roth; DC. Prod.* i. 390. An erect or decumbent more or less thinly pilose pubescent or shortly hispid annual, a few inches to 1 foot in height. Leaves from oblanceolate to linear-oval, narrowed to the base or into the petiole, generally acute, sharply often distantly serrulate or nearly entire, thinly hispid or glabrescent, ½–1 in. in length, with lanceolate or subulate stipules. Flowers small, in dense, often many-flowered

verticillasters, subsessile or pedicels equalling or slightly exceeding the calyx. Sepals lanceolate to linear, very acute, pilose or hispid and ciliate, about equal to the thin oblanceolate petals. Stamens 5, occasionally varying with fewer or more. Ovary globose; styles very short.—*B. peploides* and *B. pentandra*, Guill. et Perr. Fl. Seneg. i. 42, 44. *B. erecta*, Guill. et Perr. l. c. (an erect variety, with narrow linear-lanceolate sepals and petals).

Upper Guinea. Senegambia, *Perrottet!*
Nile Land. Nubia, *Kotschy!* Kordofan (*Schweinf. et Asch. Enum.*), also var. *erecta*.
An Indian weed, extending also to Australia.

3. **B. polyantha,** *Sond. in Linnæa*, xxiii. 17. A diffuse, much-branched, glabrous annual herb of 3–8 in.; the lateral branches often procumbent. Leaves slightly fleshy, oval-oblong, acute, the lower narrowed to the base, denticulate at least towards the apex, usually $\frac{1}{3}$–1 in. long, $\frac{1}{6}$–$\frac{1}{3}$ in. broad. Stipules lanceolate. Flowers solitary or in pairs, on slender pedicels exceeding or equalling the subtending leaf, about $\frac{1}{4}$ in. across when expanded. Sepals lanceolate or ovate-lanceolate, very acute, nearly equalling or sometimes exceeding the obtuse rose-coloured petals. Stamens 10.

Lower Guinea. Mossamedes and Benguella, Angola, *Dr. Welwitsch!*
Also at the Cape.
Scarcely, I think, specifically distinct from *B. anagalloides*, E. Meyer, and nearly allied to two Australian species.

4. **B. decumbens,** *Planch.; Harv. et Sond. Fl. Cap.* i. 116. A procumbent or ascending herb, branching from a woody stock; branches tetragonous towards the extremities, puberulous. Leaves linear or linear-lanceolate, acute, narrowed to the base, sharply serrate, glabrous or with few minute setæ, 1 in. long more or less, $\frac{1}{12}$–$\frac{1}{4}$ in. broad. Stipules subulate or linear, denticulate. Flowers in few- or many-flowered verticillasters, much shorter than the leaves; pedicels exceeding or equalling the flowers. Sepals oblong-lanceolate membranous-margined, with a firm, subulate, at length spreading acumen, equalling the oblanceolate petals. Stamens twice as many as petals, nearly equal; filaments alternately dilated below. Ovary 5-sulcate, narrowed above into the styles.—Harv. Thes. Cap. t. 24.

Mozamb. Distr. Zambesi, *Dr. Kirk!*
Also south of the tropic.

5. **B. suffruticosa,** *Fenzl in Denkschr. Bot. Gesell.* iii. 183. Shrubby decumbent or spreading, usually with very numerous opposite branchlets, at first shortly hispid; the bark at length somewhat glabrate and deciduous in papery cinnamon- or rust-coloured flakes. Leaves rather thick, varying from broadly elliptical, in the more rigid small-leaved forms, to oval, obtuse or subacute, crenate-serrulate, the margin often revolute, shortly hispid on both sides and often glandular, often fascicled in the axils, sessile or narrowed to the base and subpetiolate, 1 4 lines long. Flowers solitary or in fascicles of 2 to 6 or 8; pedicels shorter than or but slightly exceeding the ovate, thickened above and pointed or apiculate sepals. Petals obovate-oblong. Stamens 10, alternately shorter or nearly equal; filaments opposed to the sepals slightly dilated below. Ovary ovoid, 5-sulcate, narrowed into the

styles. Seeds shining, terete, slightly curved. *Lancretia suffruticosa*, Del. Fl. d'Égypte, Atlas. t. 25.

Upper Guinea. Senegal, *Heudelot!*
North Central. Kouka, *E. Vogel!* (a decumbent less woody form).
Nile Land. By the Nile, lat. 16° N., *Speke and Grant!* Sennar, *Kotschy!*

Variety (?) with oval subacute leaves, narrowed to the base, ⅓–¾ in. long.
Also an Egyptian shrub, extending to western India.
Bergia abyssinica, Rich. Fl. Abyss. i. 49, is a species of *Pollichia*.

Order XXI. HYPERICINEÆ (by Prof. Oliver.

Flowers regular, hermaphrodite. Sepals 5, imbricate in æstivation. Petals as many, hypogynous, imbricate, often contorted. Stamens indefinite, hypogynous, usually more or less distinctly connate in 3 or 5 oligo- or poly-androus phalanges or monadelphous or wholly free; anthers 2-celled, dehiscing longitudinally. Ovary 3–5-celled or subunilocular owing to non-cohesion of the placentas (in *Endodesmia* monocarpellary, 1-celled); styles free or more or less connate; stigmas terminal, usually clavate or capitate. Ovules indefinite, 2-seriate or few or solitary, erect, horizontal (or pendulous in *Endodesmia*). Fruit a capsule, dehiscing septicidally, rarely loculicidally, or baccate and indehiscent. Seeds straight or curved, exarillate, exalbuminous. Embryo with semi-cylindrical or convolute cotyledons, longer or shorter than the radicle.—Shrubs or herbs, rarely trees. Leaves opposite, rarely alternate, entire or glandular-toothed, often with opaque or translucent immersed glands, exstipulate. Flowers usually cymose, yellow or white.

A considerable Order, widely dispersed in temperate and tropical countries. Three genera are confined to Africa and the adjacent eastern islands. *Endodesmia* is monotypic and very anomalous in the Order, but it is difficult to find a better place for it.

Fruit a capsule, dehiscing septicidally. Petals glabrous within . . 1. Hypericum.
Fruit drupaceous or baccate, indehiscent.
  Petals glabrous. Stamens connate in a tube, densely covered with anthers inside . . . . . 2. Endodesmia.
  Petals hairy within. Stamens in 5 phalanges.
    Ovules solitary (or geminate?) . . . . . 3. Psorospermum.
    Ovules 2–4. Endocarp bony. (Flowers small, in broad, many-flowered, corymbose cymes) . . . . . 4. Haronga.
    Ovules about 5, ascending or indefinite, 2-seriate. Fruit baccate . . . . . 5. Vismia.

1. HYPERICUM, Linn.; Benth. et Hook. f. Gen. Pl. i. 166.

Sepals 5. Petals 5, glabrous. Stamens free or shortly tri-polyadelphous, with or without hypogynous glands. Ovary 1-celled, with 3–5 parietal placentas or more or less completely 3–5-celled; styles free or united; ovules indefinite, rarely definite or few. Capsule dehiscing by the septa or placentas. Seeds oblong cylindrical or elongate, straight or a little curved, unappendaged. —Herbs shrubs or arborescent. Leaves usually entire and punctate. Flowers usually yellow, terminal, solitary or in corymbose or paniculate cymes.

A large genus, widely spread in the northern temperate zone and frequent in the mountain ranges of intertropical countries. Of the tropical African species, 5 appear to be peculiar to Abyssinia. It is not improbable that future gatherings may render it necessary to reduce some of the following as forms of variable species.

Procumbent wiry herb. Leaves elliptical, ½ in. Flowers solitary with leafy sepals. Styles 5 . . . . . 1. *H. peplidifolium.*
Cæspitose herb of 1–2 ft. Leaves 1–1½ in., puberulous. Styles 3 2. *H. intermedium.*
Cæspitose herb of 2–10 in. Leaves ½–⅝ in., glabrous. Styles 3. 3. *H. Lalandii.*
Shrubs or arborescent. Flowers large.
  Flowers solitary. Leaves oval, ½–1 in. Sepals ⅜–½ in. . . . 4. *H. lanceolatum.*
  Flowers in few- or many-flowered cymes.
    Styles united throughout; stigma capitate. Leaves oblong-elliptical, 1–3 in. Sepals ¼–½ in. . . . . 5. *H. Quartinianum.*
    Styles united nearly to the 5-fid apex. Leaves oblong-elliptical, narrowed to the base, 1½–3 in. Sepals ⅛–⅓ in. . . 6. *H. Schimperi.*
    Styles 5, united three-quarters or more. Leaves oval-lanceolate, 1–1½ in. Sepals ½–⅝ in. . . . . 7. *H. gnidiæfolium.*
    Styles 3, divaricate. Leaves oblong, obtuse, apiculate, glabrous. Virgate undershrub . . . . . 8. *H. chrysostictum.*

1. **H. peplidifolium,** *Rich. Fl. Abyss.* i. 95. A procumbent, glabrous, wiry herb, with elongate terete branches. Leaves small, subsessile or very shortly petioled, elliptical, obtuse, entire at the base, punctate, paler and glaucous beneath, ½ in. long or less, ¼ in. broad. Flowers small, terminal, solitary, on short pedicels (¼–½ in. or less), with unequal foliaceous sepals; the outer ovate obtuse, inner narrower, with intramarginal dots. Styles 5, free from the base.

Nile Land. Abyssinia, *Schimper! Dillon and Petit!*

2. **H. intermedium,** *Steud.; Rich. Fl. Abyss.* i. 95. Herb of 1–2 ft., with erect, cæspitose, puberulous or glabrate, terete stems, from a woody or wiry stock. Leaves ovate-lanceolate or oblong-elliptical, obtuse or the upper rather acute, sessile, with a slightly cordate, clasping, more or less rounded base, puberulous on both sides or glabrous above, with numerous translucent dots, 1–1½ in. long, ⅜ ½ in. broad. Flowers numerous, in terminal paniculate cymes, less than 1 in. diam. Sepals linear-lanceolate, nearly ¼ in., with prominent, marginal, black-tipped glands. Styles 3, free from the base, as long or longer than the ovary. Seeds oblong- or cylindric-clavate terete.—*H. alomarium*, Boiss. Diag. Sér. i. 8. 114. *H. gracile*, Boiss. Diag. Ser. 2. v. 70.

Nile Land. Abyssinia, *Schimper! Roth! Dillon!*
I have no hesitation in identifying with *H. intermedium* the plants of Asia Minor described by Boissier under the names above quoted. It is nearly allied to *H. lanuginosum*, Lam., as well as to the Indian *H. adenophorum.*

3. **H. Lalandii,** *Chois.; DC. Prod.* i. 550. A more or less tufted glabrous herb of 2 or 3 to 8 in.; flowering branches erect or decumbent below, slender, angular, leafy. Leaves lanceolate- or linear-oblong, rather obtuse or acute, ascending or appressed, 1-nerved, glandular-dotted, 3–4 lines long. Flowers in dichotomous cymes; sepals lanceolate, entire. Styles 3, distinct.

Lower Guinea. Huilla, Angola, *Dr. Welwitsch!*
A Cape species. The Himalayan *H. fœtidum*, Hook. f. and Thoms. mss., appears to me identical.

4. **H. lanceolatum,** *Lam. Encycl.* iv. 145. A shrub or small tree of 20–30 feet, wholly glabrous; the young leafy twigs angular or at first very narrowly winged. Leaves numerous, spreading, often rather crowded, narrowly oval or linear-oval, acute or mucronate, impunctate or with scattered or intramarginal translucent dots, venation often subtranslucent, ⅓–1 in. long, 1–2 (occasionally 3–4) lines broad. Flowers 1½–2 in. across, solitary, terminating the leafy, often very numerous, branchlets. Sepals broadly ovate-elliptical or -rotundate, obtuse or obtusely apiculate, thinly bordered with minute glands and often dark intramarginal dots, ⅓–½ in. Petals much exceeding the sepals, obliquely oblanceolate-oblong or obovate. Stamens very shortly and often indistinctly connate at the base, in 5 phalanges. Ovary glabrous, ovoid. Styles 5, united from one-third to three-quarters from the base, rarely nearly free. Seeds very numerous, linear-elongate, often variously curved.—*H. angustifolium*, Lam. l. c.? *H. leucoptychodes*, Steud.; Rich. Fl. Abyss. i. 96.

Upper Guinea. Fernando Po, 7000–10,000 ft., and Camaroons mountain, 4000–8000 ft. (the latter with deeply divided styles), *Mann!*
Nile Land. Abyssinia, various mountainous localities, *Schimper! Roth!*
Mozamb. Distr. Manganya hills, *Dr. Meller!*

Occurs also in Bourbon; some specimens from whence have leaves 1½–2 in. long, and the sepals less broadly ovate and more acute, but the ordinary continental form grows also in the island.

5. **H. Quartinianum,** *Rich. Fl. Abyss.* i. 97. A glabrous, rather glaucous shrub. Leaves oblong-elliptical, rather acute, sessile, with a narrowly or scarcely amplexicaul base, usually with scattered, scarcely translucent dots and black intramarginal glands, 1–3 in. long, ½–1 in. broad. Flowers 2–2½ in. diam., in few- or many-flowered corymbose or terminal cymes. Sepals ¼–⅓ in. long (or sometimes very little longer), ovate-lanceolate or -oblong, rather acute, with intramarginal black dots and sometimes glandular serratures. Petals ample, much exceeding the sepals. Styles 5, united throughout; stigma capitate, 5-lobulate. Ovary 5-celled.—*H. affine*, Steud. ms. in Herb. Rich. *H. Rœperianum*, Schimp.; Rich. l. c. 96.

Nile Land. Abyssinia, *Schimper! Dillon and Petit!*
H. Rœperianum appears to be a form with the oval-lanceolate leaves more narrowed to the base, and scarcely or not at all amplexicaul. Other specimens in the Richardian Herbarium of Count Franqueville indicate this to be a variable species in the size and form of the leaves and sepals.

6. **H. Schimperi,** *Hochst.; Rich. Fl. Abyss.* i. 97. A glabrous shrub. Leaves oblong-elliptical or elliptic-lanceolate subacute or rather obtuse, narrowed or rounded to the base, which is very narrowly amplexicaul, but not cordate, with numerous translucent often linear glands, paler beneath, 1½–3 in. long, ½ to nearly 1 in. broad. Flowers 1–2 in. diam., in terminal cymes. Sepals very short, 1–2(3) lines, triangular-ovate, acute or rather obtuse, with black glandular dots within the margin. Styles 5, elongate, united

nearly to the shortly 5-fid apex. Seeds oblong-cylindrical, shortly apiculate at each end.

Nile Land. Abyssinia, in rocky mountainous places, *Schimper! Petit!*
Var. β. Leaves ovate-lanceolate, 2½ in. by 1 in. Flowers in a broad cyme.
Ankober, Abyssinia, *Roth!*
Var. γ. Sepals 2–3 lines. Petals broader.
Lower Guinea. Huilla, Angola, *Dr. Welwitsch!*
Distinguished by its small sepals.

7. **H. gnidiæfolium,** *Rich. Fl. Abyss.* i. 98. A glabrous shrub with terete extremities. Leaves approximate, oval-lanceolate, acute, narrowed slightly to the base, glabrous, rather glaucous beneath, with numerous translucent, often linear glands, 1–1½ in. long, ¼–⅓ in. broad, rarely larger on the flowering branches. Flowers about 1½ in. across in 3–5-flowered terminal cymes. Sepals, outer ovate, inner broadly oval, subacute or rather obtuse, with or without dark intramarginal immersed glands; the inner about 4 lines long. Petals narrow oval. Styles 5, united three-fourths of their length or rather more.

Nile Land. Abyssinia, *Dillon and Petit!*
H. mysorense, Wt. and Arn., of India, is closely allied, but generally has the stamens nearly or quite free.

8. **H. chrysostictum,** *Webb, Frag. Fl. Æthiop.* 54. Virgate glabrous undershrub; extremities slender, ancipitous. Leaves sessile, oblong, obtuse, apiculate, glabrous; margin slightly crisped, subrevolute. Cymes few-flowered. Sepals linear-oblong, narrowed above, mucronulate, glabrous, one-third as long as the narrow petals. Ovary ovoid, glabrous, reticulate with white lines. Styles 3, divaricate.

Nile Land. Sennar? (*Schweinf. et Asch. Enum.*).
I have not seen a specimen.

2. **ENDODESMIA,** Benth.; Benth. et Hook. f. Gen. Pl. i. 166.

Sepals 5. Petals 5, glabrous or nearly so, contorted in æstivation. Stamens very numerous, in 5 phalanges, which are connate in a cylindrical nearly entire or 5-toothed tube, closely lined with the subsessile or stipitate, apiculate anthers. Pistil monocarpellary; ovary 1-celled, with a single pendulous ovary, narrowed into the subulate-filiform style. Fruit drupaceous, indehiscent with a rather thin pericarp. Seed pendulous, exalbuminous; cotyledons oblong, plano-convex, thick and fleshy; radicle minute.—A shrub or small tree. Leaves coriaceous, opposite, without a connecting interpetiolar line, entire, acuminate, glabrous, impunctate, with transverse, closely parallel lateral veins. Flowers yellow, in terminal corymbose cymes.

But a single species is known, confined to equatorial W. Africa.

1. **E. calophylloides,** *Benth. in Gen. Pl.* i. 166. Branches terete, smooth, with an evanescent glaucous bloom. Leaves oval- or lanceolate-oblong, with a slender, rather obtuse, acumen, 2–3½ in. long, ¾–1¼ in. broad; petiole about 2 lines. Flowers about ¾ in. when expanded, on pedicels 1

length much thickened, equalling or shorter than the calyx. Drupe rather oblique, oblong, narrower above, about ¾ in. in length.

Upper Guinea. Gaboon and Camaroons rivers, *Mann!*

Remarkable in the Order in its peculiar venation, which resembles that of the genus *Calophyllum*.

3. PSOROSPERMUM, Spach; Benth. et Hook. f. Gen. Pl. i. 167.

Sepals 5. Petals 5, usually villous within. Stamens 5-adelphous; phalanges opposite to the petals, oligandrous; squamæ 5, alternating with the phalanges. Ovary 5-celled; styles distinct; stigmas clavate-capitate; ovules solitary (or geminate), ascending. Fruit baccate, indehiscent. Seeds erect, unappendaged; testa (at least sometimes) with conspicuous immersed glands; embryo straight; cotyledons convolute or plano-convex, radicle short.—Shrubs or trees. Leaves opposite, sometimes with interpetiolar connecting lines. Flowers in terminal or lateral cymes.

A genus of 10 or 12 species confined to Tropical Africa and Madagascar. See remark under *Vismia*. I have not identified any of the following with insular species:—

Densely tomentose. Leaves alternate or opposite, elliptical or oblong-elliptical	1. *P. senegalense.*
Extremities tomentose or glabrous. Leaves rather coriaceous, broadly elliptical to oblong, obtuse or broadly acute, reticulate and glabrous or rusty-tomentose beneath. Petiole 1–2 lines or 0	2. *P. febrifugum.*
Glabrous. Leaves submembranous, elliptical, acute or obtusely acuminate. Flowers in terminal cymes. Petiole 2–3 lines	3. *P. tenuifolium.*
Glabrous. Leaves coriaceous, obovate-elliptical, lower alternate. "Panicles axillary or lateral." Petiole 4–6 lines	4. *P. alternifolium*

1. **P. senegalense,** *Spach in Ann. Sc. Nat. Ser.* 2. v. 164. Shrub the branches and young leaves clothed with a pale rusty-brown tomentum deciduous on the old wood and partially on the upper surface of the leaves which are opposite or alternate, elliptical or oblong-elliptical, subacute o obtusely apiculate, narrowed or rounded at the base, but not cordate, 2–3 in. long, 1–1½ in. broad; petioles 2–3 lines. Flowers densely tomentose in axillary and terminal umbellate panicles shorter than the leaves or collecte in terminal corymbose panicles a little exceeding the uppermost leaves. To mentose pedicels equalling or twice as long as the calyx. Stamens 5–8 i each phalange. Ovules solitary, ascending.—Fl. Seneg. t. 23 (*exclusive o the dissections*). (*Vismia guineensis*, Chois. Monog. Hyper. 36 ?)

Upper Guinea. Senegambia! Sierra Leone, *Hutton!* Niger, *Barter!*

2. **P. febrifugum,** *Spach in Ann. Sc. Nat. Ser.* 2. v. 163. A shrub o small tree. Extremities rusty pubescent-tomentose at first or rarely gla brous. Leaves usually opposite, rarely ternate, rather coriaceous, narrowl or broadly elliptical, broadly pointed or obtuse, rarely broader above th middle, more or less rounded, subcordate, sometimes slightly narrowed t the base, soon glabrous and shining above, thinly pubescent or midrib onl pubescent and finely reticulated with paler areolæ beneath, 1–4 in. long, ¾ 2 in. broad; petioles 1–2 lines or leaves subsessile, interpetiolar line obsolete Flowers tomentose or nearly glabrous, in small terminal cymes often upo

short lateral branchlets or overtopped by lateral shoots, sometimes many-flowered and corymbose. Stamens 5–10 in each phalange. Ovules solitary erect or occasionally in pairs.—*P. ferrugineum*, Hook. f. Fl. Nigrit. 241.

Upper Guinea. Sierra Leone, *Don !*
Lower Guinea. Congo, *Smith !* Angola, *Dr. Welwitsch !*
Mozamb. Distr. Manganya Hills, Zambesi-land, *Drs. Kirk and Meller !*

Var. *glabra*. Leaves occasionally oblong or oblanceolate. Niger, *Barter !*
Var. *albida*. Leaves glabrous or nearly so, whitish beneath. Huilla, Angola, *Dr. Welwitsch !* Zambesi, *Dr. Kirk !*

Psorospermum Afzelii, very imperfectly described by Turczaninow in Bull. Mosc. xxxvi. 579, is probably *P. febrifugum*. If not, it may be *Vismia Leonensis*, but I have no means of determining.

This appears to be a widely spread and variable species, or, as I here leave it, possibly an assemblage of 2 or 3 species.

3. **P. tenuifolium,** *Hook. f. Fl. Nigrit.* 242. A perfectly glabrous shrub. Leaves rather membranous, opposite, elliptical, narrowed at each end, obtusely apiculate or shortly acuminate or rather acute, punctate with opaque glands, 2½–4 in. long, 1–1¾ in. broad; petioles 2–3 lines long, connected by a faint interpetiolar line. Flowers in terminal corymbose or subumbellate cymes shorter than the upper leaves; pedicels rather longer than to twice as long as the sepals. Sepals rather obtuse, glabrous or ciliolate above. Stamens about 5–7 in each phalange. Ovary 5-celled; ovules solitary, erect (or geminate, Fl. Nigrit. l. c.).—Fl. Nigrit. t. 21.

Upper Guinea. Niger, *T. Vogel ! Barter ! Mann !* Brass, *Barter !* Old Calabar, *Thomson !*
Nile Land. Sennar, *Cienkowski.*

The eastern plant is described under a ms. name given by the late Dr. Kotschy in Schweinfurth's Beitr. Fl. Æthiop., 235, as a distinct species, *P. niloticum*. The alleged specific characters are slight. The leaves are said to be more nearly sessile, less membranous and rounded or subcordate at base. I have not seen specimens.

4. **P. alternifolium,** *Hook. f. Fl. Nigrit.* 243. A perfectly glabrous shrub with elongate, slender, terete, glaucous branches. Leaves coriaceous, the lower alternate, shining above, obovate-elliptical, obtuse or apiculate, more or less cuneate at base, 4–7 in. long, 2½–4 in. broad; petioles 4–6 lines. Flowers in di-trichotomous lateral panicles, Sepals glabrous, rather obtuse. Stamens about 10–12 in each narrow-linear pilose phalange; ovules solitary (sub-biovulate, Fl. Nigrit.). Seeds with folded cotyledons.

Upper Guinea. Sierra Leone, *Don !*
I have seen but a very imperfect specimen, so that most of the above description is taken from the 'Niger Flora.'

4. **HARONGA,** Thouars; Benth. et Hook. f. Gen. Pl. i. 167.

Sepals 5. Petals 5, villous above on the inner side. Stamens 5-adelphous, phalanges opposite to the petals, 3-oligandrous; squamæ 5, alternating with the phalanges. Ovary 5-celled. Styles distinct above; stigmas capitate; ovules 2–4, ascending. Drupes small, globose, each carpel with a bony endocarp, containing 2–4 seeds. Seeds eglandular, terete; embryo

with the radicle equalling or rather shorter than the cotyledons.—A shrub or tree with opposite entire leaves connected by a rather prominent interpetiolar ridge. Flowers small, in broad corymbose terminal cymes.

The following is the only species of the genus, limited to Africa and its islands.

1. **H. madagascariensis,** *Chois.; DC. Prod.* i. 541. A shrub or sometimes arborescent, attaining 30–50 ft. Branches rusty or hoary with a short deciduous tomentum or hoary-puberulous. Leaves opposite, ovate-oblong or -elliptical, acute or apiculate, rounded sometimes very broadly or even cordate at the base, usually more or less rusty-tomentose when young, early glabrous or glabrescent above, tomentose or nearly glabrous and usually much paler or glaucescent with rather prominent midrib and secondary veins below, 3–6 in. long, 1½–3 in. broad (or occasionally larger, 10 in. by 5 in.); petioles ½–¾ in. Berries smooth, the size of small pepper-grains.—Lam. Ill. t. 645. *Arungana paniculata*, Pers. Syn. Pl. ii. 91. *Psorospermum Leonense*, Turcz. in Bull. Mosc. xxxvi. 578 (*ex descr.*).

Upper Guinea. Senegambia! Sierra Leone, *Barter!* Fernando Po, *T. Vogel!* and others; Grand Bassa, *T. Vogel!* Old Calabar, *Mann!*
Lower Guinea. Golungo Alto, Angola, *Welwitsch!*
Mozamb. Distr. Mozambique, *Forbes!* Zambesi, *Peters*, (*ex Klotzsch*, who gives synonymy.)
Also in Madagascar and Mauritius.

5. **VISMIA,** Vell.; Benth. et Hook. f. Gen. Pl. i. 166.

Sepals 5. Petals 5, usually villous within. Stamens 5-adelphous, phalanges opposite to the petals, oligo- or polyandrous; squamæ 5, alternating with the phalanges. Ovary 5-celled (or placentas imperfectly cohering); styles distinct; stigmas clavate-capitate. Ovules indefinite biseriate, or about 5, ascending. Berry indehiscent. Seeds horizontal or ascending, terete eglandular, unappendaged. Embryo straight or slightly curved.—Shrubs o trees. Leaves opposite, entire, more or less glandular-punctate, the petiol connected by a transverse line or ridge. Flowers in terminal or axill cymes.

Principally a South American genus. Very nearly allied to *Psorospermum*, but we obtain both flower and fruit of the following species and of the species described *Psorospermum*, it may be convenient to distinguish the genera by the number of the ovules. When the fruits of all shall have been collected, it is probable some use may be made of the form of the cotyledons and presence or absence of glands in the testa.

Leaves with a cordate base. Stamens 4–6 in each phalange. Ovules about 5 in each cell . . . . . 1. *V. rubescens.*
Leaves acute, cuneate or rounded not cordate at the base.
Extremities rusty-tomentose. (Stamens 20–40 in each phalange?) Ovules 10–12 . . . . . 2. *V. Leonensis.*
Extremities glabrous or with a pilose ring at insertion of lateral branches.
Leaves membranous. Cymes rounded, 1–1½ in. across . . . . 3. *V. affinis.*
Leaves rather coriaceous. Cymes corymbose, 2–3 in. across . . . 4. *V. frondosa.*

1. **V. rubescens,** *Oliv.* A climbing shrub attaining 20 ft. with terete smooth opposite branches, at first minutely puberulous, soon glabrous.

Leaves rather coriaceous, opposite, broadly elliptical, apiculate, with a cordate base, punctate with numerous opaque glands, glabrous, or prominent midrib obsoletely puberulous beneath, 3–4 in. long, 2–3½ in. broad; petioles 2–4 lines, connected by a prominent or winged interpetiolar ridge. Inflorescence paniculate, trichotomous, equalling or exceeding the leaves, consisting of numerous small, subumbellate flowers on pedicels about equalling the sepals. Sepals ovate-lanceolate, rather obtuse, half as long as the petals, nearly glabrous, with conspicuous black glands. Stamens 4–6 in each linear phalange. Glands thick, notched, rather shorter than the ovary. Ovary sub-5-locular, the placentas imperfectly cohering; ovules about 5 in each cell, ascending.

Upper Guinea. River Muni, *Mann!*
I have not seen the fruit.

2. **V. leonensis,** *Hook. f. Fl. Nigrit.* 243. A small tree. Leafy branchlets opposite, rusty-pubescent at first. Leaves opposite, rather coriaceous, elliptical or elliptic-lanceolate, narrowed to each extremity, glabrous above, obsoletely pubescent or glabrescent beneath, rusty-pubescent on expansion, 2–4 in. long, ¾ 1¼ in. broad; petioles 2–3 lines long, connected by a faint interpetiolar ridge. Flowers in pedunculate umbellate axillary panicles or cymes or from the axils of and shorter than the last pair of leaves; pedicels pubescent, three to four times as long as the sepals. Sepals ovate-oblong, obtuse, concave, obtusely keeled, about half as long as the petals, which are densely pilose within. Stamens numerous (20–40 in the Bagroo plant) in each phalange; filaments free above on the outer side. Ovary 5-celled; ovules 10–12 in each cell, biseriate, the lower horizontal, the upper ascending. Seeds irregularly compressed, 6 or more in each cell of the fruit. —*Hypericum guineense*, Linn. Amœn. Acad. vii. 321. t. 8. fig. 1?

Upper Guinea. Sierra Leone, *T. Vogel!* Bagroo river, *Mann!*
Dr. Vogel described this species as cultivated. As the Bagroo specimens are in flower only and those from Sierra Leone in young fruit, it is possible that they may prove distinct.

3. **V. affinis,** *Oliv.* A small tree. Extremities slender, glabrous and apparently somewhat glaucous, with a ring of short tufted rusty hairs at the origin of the axillary ramuli. Leaves opposite, very thinly coriaceous or membranous, elliptical, usually more or less acute or slightly acuminate, narrowed or broadly cuneate at the base, obsoletely and remotely undulate-crenate, glabrous, 1½–3 in. long, 1–1½ in. broad (occasionally 4 by 1½ in.); petiole 1–3 lines. Cymes somewhat umbellate, shortly pedunculate, 1 1½ in. diam. Peduncle ½ in. or shorter; pedicels equalling or exceeding the flower, with the calyx rusty-tomentose. Sepals not perceptibly keeled, oblong- or ovate-lanceolate. Stamens about 7 in each phalange. Ovules apparently 4–8 in each cell. Ripe fruit not seen.

Lower Guinea. Golungo Alto, Angola, *Dr. Welwitsch!*
Nearly allied in all technical characters to *V. frondosa*, though with a distinct *facies*, owing to the smaller, more elliptical, and much thinner leaves and much smaller cymes. It may prove a variety, though I find no intermediate forms to justify me in uniting it to that species.

4. **V. frondosa,** *Oliv.* A small spreading tree. Branches glabrous,

the younger lateral ramuli with a ring of rusty hairs at their insertion. Leaves rather coriaceous, oblong-elliptical or elliptical, acute or acuminate; base slightly narrowed or cuneate at the petiole, glabrous, shining above, 2½–4 in. long, 1¼–2 in. broad; petiole 2–3 lines. Flowers in rather broad, dichotomous, many-flowered, terminal cymes, 2–3 in. across, on a peduncle of ½–1 in.; pedicels ¼–⅜ in. with the calyx rusty-tomentose. Sepals ecarinate. Stamens about 8 in each phalange. Ovules 6–9 in each cell of the ovary. Fruit not seen.

Lower Guinea. Golungo Alto, Angola, *Dr. Welwitsch!*

Order XXII. GUTTIFERÆ (by Prof. Oliver).

Flowers regular, diœcious, polygamous or hermaphrodite. Sepals 2–6, imbricate or in decussate pairs. Petals 2–6, rarely more, usually much imbricated or contorted. Male fl.: Stamens usually indefinite, hypogynous; filaments free or variously connate, monadelphous or in as many phalanges as petals; anthers various. Female fl.: Staminodia various. Ovary 1–2–∞-celled; ovules 1, 2, or indefinite, axile or erect from the base of the cavity, rarely parietal (*Allanblackia*); stigmas as many as cells of the ovary or variously consolidated, sometimes peltate, entire, sessile, subsessile or with more or less elongate style. Fruit usually baccate, indehiscent with a fleshy or pulpy pericarp. Seeds large, exalbuminous; embryo of a large radicle (*tigella*) with small or obsolete cotyledons or of thick conferruminate or free cotyledons and very short inferior radicle.—Trees or shrubs abounding in a yellow or greenish juice. Leaves opposite, coriaceous or submembranous, rarely verticillate, usually exstipulate. Flowers axillary or terminal, solitary fascicled subracemose or panicled, white yellow or red.

A large and exclusively tropical family, more abundant in America and Asia than in Africa. Two of the following genera are endemic.

Ovary 1-celled with indefinite ovules on 5 parietal placentas . . .	1. Allanblackia.
Ovary with 2 or more cells.	
Ovules 3 or more in each cell. Ovary 5-celled.	
Sepals 5, much shorter than convolute petals	2. Symphonia.
Sepals 5, inner larger, nearly equalling the petals	3. Pentadesma.
Ovules solitary.	
Sepals 4, in decussate pairs	4. Garcinia.
Sepals 5	5. Xanthochymus.
Ovules 2 in each cell. Calyx closed before flowering, at length bipartite	6. Ochrocarpus.

1. ALLANBLACKIA, Oliv.; Benth. et Hook. f. Gen. Pl. i. 980.

Flowers unisexual. Sepals 5, broadly imbricating, the outer successively smaller. Petals 5, obovate-cuneate. Male fl.: Stamens 5-adelphous, phalanges cuneate-spathulate, opposite to the petals, polyandrous; anthers sessile or subsessile, broadly elliptical or rotundate, 2-celled, dehiscing longitudinally, unappendaged. Central disk (rudiment of ovary) deeply 5-lobed; lobes alternate with the phalanges, deeply tuberculate-corrugate on the upper face. Female fl.: Rudimentary phalanges very short and thick. Ovary conical, thick, unilocular, with 5 parietal placentas; stigma sessile or sub-

sessile, peltate, smooth, entire; placentas slightly projecting, free throughout, each with about 16–20 biseriate, hemianatropous, ascending ovules with an inferior micropyle. Ripe fruit not seen. (Young fruit elongate-conical, crowned with the persistent stigma.)—A glabrous tree with opposite, rather coriaceous, penniveined leaves. Flowers in terminal or subterminal umbellate racemes or panicles, 1½–2 in. diam.

A monotypic genus known only from Biafra.

1. **A. floribunda,** *Oliv. in Journ. Linn. Soc.* x. 43. A tree of 40 ft. with terete branches. Leaves oblong-elliptical or slightly ovate-oblong, more or less contracted to the acuminate or apiculate apex, rounded or sometimes subcordate at the base, with a prominent midrib beneath and numerous parallel scarcely prominent lateral veins, 4–6 in. long, 1½–2½ in. broad; petiole ⅓–½ in. Flowers rather numerous, about 1½ in. diam., in terminal rather umbellate, racemes or subpaniculate, the leafy axis sometimes produced beyond the inflorescence; peduncles stout, 1½–2 in. long, 1–3 together, from the axils of the uppermost reduced leaves. Sepals coriaceous, orbicular, concave, the outermost much smaller than the inner and sometimes slightly lower than the rest. Petals obovate-cuneate, twice as long as the inner sepals and exceeding the phalanges in the male flower. Anthers closely crowded on the upper face of the cuneate-spathulate phalanges towards the apex. Stigma about ¼ in. broad.—Hook. Ic. Plant. 1004.

Upper Guinea. Camaroons river, *Mann!*

2. SYMPHONIA, Linn. f.; Benth. et Hook. f. Gen. Pl. i. 173.

Flowers hermaphrodite. Sepals 5, broadly rotundate, imbricate. Petals 5, exceeding the sepals, closely convolute. Stamens 15, in 5 phalanges, connate nearly or quite to the extrorse linear anthers; anthers of each phalange connate, produced into a lanceolate or triangular connective. Disk cupuliform, thick, surrounding the base of the staminal column. Ovary 5-celled. Style thick short or elongate, deeply 5-lobed above; lobes radiate with a minute apical stigma; ovules usually 3–5 in each cell (in the African species). Fruit an ellipsoidal 1-seeded berry (or globose, few-seeded). Embryo an undivided thick radicle (*tigella*); cotyledons 0.—Trees or shrubs with parallel-penniveined leaves. Flowers umbellate, crimson.

A small genus of which all the species, excepting the following, appear to be confined to Madagascar.

1. **S. globulifera,** *Linn. f. Suppl.* 302. A tree of 20–80 ft., perfectly glabrous, with oval-oblong rather coriaceous leaves narrowed to each end, usually shortly and obtusely acuminate, sometimes rather broader above the middle, gradually tapering to the petiole, 3–4 in. long, ¾–1½ in. broad; petiole ½–¾ in. Flowers in many-flowered umbels, solitary or 2 or 3 together, terminating lateral shoots shorter than the surrounding leaves or upon very short stout peduncles; pedicels ¼–1 in. long. Buds ¼–½ in. Ovules 3–5 in each cell of the ovary. Fruit 1-seeded, ellipsoidal, about ⅝ in. in length, crowned by the remains of the style (? or globose several-seeded). Seeds glabrous or, from the fibrous dissolution of the testa, apparently tomentose

here and there.—Mart. Nov. Gen. iii. t. 287 (*Moronobea*); Presl, Symb. t. 48 (*Aneuriscus*).—See Pl. et Triana, Ann. Sc. Nat. Ser. 4. xiv. 286.

Upper Guinea. Gaboon and Old Calabar, *Mann!* (? Niger, *Barter!*)
Lower Guinea. Golungo Alto, Angola, *Dr. Welwitsch!*
Grows also in N. Brazil to Panama. The pistil and staminal column I have seen considerably more elongated in American than in African specimens. The specimen collected by Barter on the Niger is in bud and is accompanied by a globose several-seeded fruit. So far as the leaves and flowers are concerned, I find no ground whatever for regarding it as distinct from Mr. Mann's specimens, but the difference in the fruit and seeds—the latter being nearly smooth and not sinuous-rugose as in Mann's plant (the true *S. globulifera*)—leads me to think it may prove distinct and perhaps a species of *Chrysopia*, Thouars (Pl. et Tr.). If so, it confirms the propriety of uniting *Chrysopia* with *Symphonia*, as is done in the 'Genera Plantarum' (l. c.). In Barter's plant, the seeds have a separable papery testa; in Mann's, the testa appears to be closely adherent to the embryo, following the convolutions of its surface. Barter says this tree yields "a gum like gamboge."

3. **PENTADESMA,** Sabine; Benth. et Hook. f. Gen. Pl. i. 174.

Flowers hermaphrodite. Sepals 5, imbricate, the inner larger. Petals 5, equalling or exceeding the inner sepals. Stamens numerous, 5-adelphous, very shortly connate in each phalange; filaments free above, continued to the apex of the narrow elongate extrorse anther-cells. Ovary 5-celled, narrowed into the elongate style divided at the apex into 5 spreading linear lobes; ovules several in each cell. Fruit baccate with a thick fleshy pericarp, 3–5-celled. Seeds large, 1 or 2 in each cell; testa glabrous, shining; albumen 0; embryo an undivided thick radicle (*tigella*); cotyledons 0.—A large glabrous tree, abounding in a yellow juice. Leaves coriaceous, penninerved. Flowers large, red, terminal, solitary.

A monotypic genus confined to W. tropical Africa.

1. **P. butyracea,** *Don, Gen. Syst.* i. 619. Leaves coriaceous, or submembranous on shaded barren shoots, shining, oblong-elliptical, sometimes elongate-oblong or oblong-oblanceolate, shortly acuminate or rather obtuse, rounded or cuneate at the base, with numerous parallel veins obliquely connecting the midrib and intramarginal vein, 5–10 in. long, 1½–2½ in. broad; petioles ½–½ in. or 1 in. on barren shoots. Flowers large, "terminal solitary." Inner sepals 1½–2 in. long, coriaceous, persistent. Phalanges of stamens persistent. Fruit irregularly ovoid, 4–5 in. long by 3–3½ in. diam., 3 5-seeded; pericarp about ½ in. thick, slightly rugose, abounding in a yellow greasy fluid, exuding when cut. Seeds 1½–2 in. long by 1–1½ in. diam.

Upper Guinea. Sierra Leone, *Don! Dr. Kirk!* Nun river, W. tropical Africa, *Mann!* (? Niger (leaves only), *Barter!*)
This is the "Butter- and Tallow-tree" of W. Africa.

4. **GARCINIA,** Linn.; Benth. et Hook. f. Gen. Pl. i. 174.

Flowers polygamous or diœcious. Sepals 4, in opposite pairs. Petals 4 (5 in *G. Livingstonei*). Male fl.: Stamens indefinite, free, tetradelphous or monadelphous; anthers erect or peltate, dehiscing longitudinally or circumscissile. Female or hermaphrodite fl.: Staminodia various, free or united.

Ovary 2–∞-celled; stigma sessile, lobed, smooth or tuberculate; ovules solitary. Fruit baccate. Embryo an undivided thick radicle (*tigella*).—Glabrous trees, usually with a yellow juice. Leaves coriaceous or submembranous, opposite or ternately verticillate. Flowers solitary, fascicled or subpaniculate, axillary or terminal.

A considerable genus, confined to the tropics of the Old World, most numerous in Asia. The African species appear to be endemic.

In all the tropical African species of which I have seen flowers, the sepals of the outer pair are much smaller than those of the inner. It is possible, therefore, that by Messrs. Planchon and Triana, the authors of a recent admirable monograph of the *Guttiferæ*, they would be referred to the genus *Rheedia*, their African *R. Smeathmanni*, a Sierra Leone plant, being described with 2 minute bracteoles contiguous to the (diphyllous) calyx; a diphyllous calyx being a character of that genus. It will be observed that, with the same condition as to the calyx, we have in tropical Africa both free stamens and stamens wholly or variously connate in distinct or united phalanges. *Rheedia Smeathmanni*, Pl. et Tr. (described from a single leaf, and flowers of which the petals and sexual organs have been destroyed by insects), I include in *Garcinia*.

Filaments free, at least above, in the males.

Stamens distinct, singly inserted in disk; anthers peltate-affixed. Leaves very coriaceous, broadly elliptical obtuse . . . . . 1. *G. Livingstonei.*
Stamens in 4 deeply trifid (tri-(olig-)androus) phalanges. Leaves oval . . . . . 2. *G. ovalifolia.*
Stamens free or variously connate, inserted in corrugate disk. Leaves oblanceolate coriaceous . . . . . 3. *G. Barteri.*
Stamens in 4 phalanges. Leaves coriaceous, 4–9 in., oblong-elliptical . . . . . 4. *G. polyantha.*

Filaments connate throughout in four distinct or united phalanges.

Anthers linear, recurved above, multilocellate . . . . . 5. *G. Mannii.*
Anthers short, radiating around semicircular phalange . . . . . 6. *G. punctata.*
Leaves oval, subacute, with prominent subparallel veins. Female flower with short bracteate peduncle or subsessile . . . . . 7. *G. huillensis.*

1. **G. Livingstonei,** *T. And. in Journ. Linn. Soc.* ix. 263. A shrub or bush-like tree, with a trunk sometimes 3 ft. diam. (*Dr. Kirk*). Leaves very coriaceous, opposite or ternate, broadly elliptical or obovate-elliptical, apex very obtusely rounded entire or slightly emarginate; base rounded or broadly cuneate; lateral veins prominent above, rather irregular, $\frac{1}{6}$–$\frac{1}{2}$ in. apart; 3–3$\frac{1}{2}$ in. long, 1$\frac{1}{2}$–2$\frac{1}{4}$ in. broad, subsessile or on petioles not exceeding 1 or 2 lines. Flowers axillary, often from the wood of the previous year or still older branches; pedicels $\frac{1}{2}$–1 in. long, often fascicled on thickened leafless nodes. Two outer sepals minute, orbicular; two inner broadly ovate-rotundate, equal or unequal, about half as long as, or the inner nearly equalling, the 5 white or pale greenish petals. Male fl.: Stamens indefinite, distinct, spreading, the rather thick filaments singly inserted in the disk; anthers small, oblong, peltately affixed, 2-celled, dehiscing longitudinally; rudiment of ovary 0. Hermaphrodite fl.: Stamens about 15 or more, inserted in the fleshy hypogynous disk. Ovary usually 2-celled, with a sessile 2-lobed stigma and solitary ovules. Berry 2–(3)-seeded, 1–1$\frac{1}{2}$ in. diam., with a fleshy juicy pericarp, which is said to be pleasant eating.

Mozamb. Distr. Zambesi, *Drs. Kirk and Meller!* The "Motsauri" or "Mokononga," of the native tribes (*Dr. Kirk*); (? Angola, *Dr. Welwitsch!* Niger, *Barter!*).

Dr. Welwitsch's specimens consist of examples in young fruit, the petals fallen, but with numerous free stamens remaining, inserted in the hypogynous disk, from the district of Bumbo, and of male flowers from the Libongo district; the latter with 9–10 segments in the perianth (calyx and corolla), and the stamens singly inserted in a corrugate disk, the anthers rotundate, dehiscing longitudinally. The leaves of the Bumbo plant are oblanceolate and considerably narrowed to the base, but in other respects it agrees with the Libongo form, and I think it very probable that they may both be specifically identical with *G. Livingstonei*.

2. **G. ovalifolia,** *Oliv.* A small tree. Leaves thinly coriaceous, elongate-oval or oval-oblong, narrowed to each end, obtuse or obtusely acuminate, with numerous lateral veins curving forward, 4–7 in. long, 1–2¼ in. broad; petiole ¼–½ in. Flowers small in axillary fascicles; peduncles not exceeding the petioles; 2 outer sepals minute (¾ line); 2 inner ovate-rotundate, concave, 3 times larger, about half as long as the (erect?) petals. Stamens in 4-trifid tri-(olig-)androus phalanges; filaments free above; anthers minute, 2-celled, dehiscing longitudinally. Rudiment of ovary 0.

Upper Guinea. Niger, *Barter!*

3. **G. Barteri,** *Oliv.* A small tree. Leaves coriaceous, oblanceolate, subacute or very shortly apiculate, narrowed to the base, with prominent midrib and scarcely prominent, curving, oblique, lateral veins beneath, 4–6 in. long, about 2 in. broad; petiole ¼–⅓ in. Flowers axillary or from nodes of fallen leaves; pedicels slender, ¼ in. long. Two outer sepals much smaller than the inner. Stamens indefinite, the short filaments variously united or free, inserted in a corrugate fleshy disk; anthers erect, 2-celled, dehiscing longitudinally.

Upper Guinea. Brass, *Barter!*
In fruit only or without flowers.

4. **G. polyantha,** *Oliv.* A tree of 70 ft. or sometimes shrub-like, falling short of 20 ft. Leaves large, coriaceous, broadly oblong-elliptical or slightly obovate, shortly apiculate, cuneate-rounded at the base, with oblique curving lateral veins, the principal ones usually ½–¾ in. apart in the larger leaves, 4–9 in. long, 1½–4 in. broad; petioles ¼–1 in. Male flowers numerous, in rather crowded, axillary fascicles equalling the petioles; female fewer, axillary, on peduncles of ¾–1 in. Two outer sepals orbicular, 1 line diam., coriaceous, 2 inner about equal to the petals. Male fl.: Stamens in 4 phalanges, inserted between the lobes of a corrugated fleshy disk opposite to the petals, each phalange of 7–10 stamens free above; anthers minute, 2-locular, dehiscing longitudinally. Female fl.: Phalanges of rudimentary stamens shorter than the ovary, which is depressed-ovoid, 2-celled, with a sessile, slightly 2-lobed stigma and solitary ovules. Young berries (½ in. diam.) globose coriaceous.

Upper Guinea. Nun river, *Mann*, ♂! Fernando Po, *Mann*, ♀! "Lagos or Prince's Island," *Barter!*
(? Golungo Alto, Angola, *Dr. Welwitsch!* without flower or fruit.)

SPECIES OF GARCINIA IMPERFECTLY KNOWN.

5. **G. Mannii,** *Oliv.* A tree of 30–60 ft., with straight, opposite, leafy branches. Leaves submembranous, oblong-elliptical, rather abruptly and obtusely acuminate, cuneately contracted to the petiole, with numerous oblique parallel lateral veins, 3–4 in. long, 1½–2 in. broad; petiole ¼–½ in. Peduncles axillary or terminal, much shorter than the leaves, 1-flowered or with 1 or 2 pairs of opposite 1-flowered pedicels of ⅓–½ in., bearing a pair of minute opposite bracteoles below the middle. Flowers about ½ in. to 1 in. diam. Sepals orbicular, concave, 2 outer 2–3 times smaller than the inner. Petals rather thick, obovate-elliptical. Stamens in 4 short distinct or connate phalanges opposite to the petals, scarcely exceeding the central quadrate disk, the stamens of each phalange connate throughout; linear multilocellate anthers recurved above.

Upper Guinea. Ambas Bay and Sierra del Crystal, *Mann!*

6. **G. punctata,** *Oliv.* A tree of 15–30 ft., with rather slender divaricate green branches. Leaves thinly coriaceous, oblong-elliptical, with a narrow obtuse acumen; base cuneate or slightly rounded, punctate, with linear and irregular translucent dots; 3–4 in. long, 1–1¾ in. broad; petiole 2–3 lines. Male flowers (yellow) subsessile or on pedicels not exceeding 1 line, in few-flowered axillary and terminal fascicles, on very short or obsolete common peduncles, about ½ in. diam. when expanded. Sepals 4, 2 outer much smaller. Petals 4, obovate- or oblanceolate-oblong, patent. Stamens in 4 phalanges; filaments of each phalange connate throughout; anthers 5–7 on the margin of a subreniform dilatation, short, elliptical, recurved, dehiscing longitudinally. Disk entire, hemispherical, smooth. Female flowers not seen.

Upper Guinea. Gaboon river and Sierra del Crystal, *Mann!*
Lower Guinea. Golungo Alto, Angola, *Dr. Welwitsch!*

Var. β. *pedicellata.* Pedicels often ¼ in.
Allied to *G. Mannii*, differing in the subsessile smaller flowers, short anthers, etc.

7. **G. huillensis,** *Welw. mss.* A small bush-like tree of 7–10 ft. Extremities rather stout. Leaves coriaceous, narrowly or sometimes rather broadly elliptical, more or less narrowed to each end, rather obtuse and mucronulate or subacute; lateral veins numerous, prominent above and below, subparallel, directed forwards and forking, about 3 in. long, 1½ in. broad; petiole very short, about 1 line, dilating into the lamina. Flowers solitary and axillary or terminal, occasionally 3 or 4 together; peduncles very short, with decussating scaly bracts or flowers subsessile. Calyx and corolla of about 8 segments, 2 exterior opposite, remainder imbricate, but apparently not decussate. Male flowers not seen. In the female flower I observe no trace of stamens. Ovary 4-celled, with 1 ovule in each cell (according to Dr. Welwitsch); stigma viscid, subhemispherical, peltate, subsessile. Fruit not seen.

Lower Guinea. Huilla, Angola, *Dr. Welwitsch!*

8.? **G. ? sp. nova.** Tree of 30 ft. Leaves large, rather coriaceous,

broadly oblong-elliptical, shortly and finely acuminate, 12–14 in. long, 4–5 in. broad, with very prominent midrib and lateral veins (½–1 in. apart) below; petiole ¼ in. Branches terminating in long, leafless, subflagelliform extremities, with opposite or alternate ramuli below, bearing at the numerous, alternate, prominent nodes, minute sessile fascicles of abortive (leaf or flower ?) buds.

Upper Guinea. Sierra del Crystal, *Mann !*

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9. ? **G. ? Smeathmanni,** *Oliv.* Branches terete. Leaves coriaceous, petiolate, broadly ovate-oblong, shortly cuspidate, rather obtuse at the base, penninerved and reticulate, about 6–8 in. long, 3 in. broad; petiole ¾ in. Flowers small, pedicellate, in crowded fascicles from thickened multibracteolate axillary pulvini; pedicels filiform, about equalling the petioles.—*Rheedia Smeathmanni*, Pl. et Tr. Mém. Gutt. 157.

Upper Guinea. Sierra Leone, *Smeathmann !*

The authors of this species suggest the possibility that it may be identical with *Xanthochymus guineensis* of Don.

5. **XANTHOCHYMUS,** Roxb.; Benth. et Hook. f. Gen. Pl. i. 175.

Flowers polygamous or diœcious. Sepals 5, imbricate. Petals 5. Male fl.: Stamens in 5 narrow oligandrous phalanges, inserted into or between the lobes of a fleshy disk. Female or hermaphrodite fl.: "Staminodia in 5 phalanges, alternating with as many glands. Ovary 3–5-celled, with a subsessile, discoid, entire or radiately 3–5-lobed stigma; ovules solitary. Fruit baccate. Embryo thick, fleshy, with inconspicuous cotyledons."—Trees, resembling the preceding genus. Flowers axillary or terminal, fascicled or racemose.

A small genus, closely allied to *Garcinia*, and scarcely differing, except in its pentamerous symmetry, confined also to the tropics of the Old World. The following species is a doubtful member of the genus, as I have seen only male flowers:—*X. guineensis*, Don, Gen. Syst. i. 621, of Sierra Leone, it is impossible to identify from the brief indication given.

1. **X. ? quadrifarius,** *Oliv.* A small tree. Leaves submembranous or thinly coriaceous, oblong-elliptical, rather obtusely apiculate, more or less rounded to the petiole, with distant, obscure, lateral veins; 3½–5 in. long, 1½–2 in. broad; petioles ¼–½ in. Male flowers numerous, in terminal umbellate racemes, 1½–2 in. diam., the common peduncle lengthening out to 1 in. or more, tetragonous, closely pitted on each face with the sockets of the articulated fallen pedicels of ½–¾ in. Sepals subequal, ovate, obtuse. Petals elliptical or obovate, much exceeding the sepals. Stamens in narrow-linear phalanges, each of 8–10 stamens, equalling or exceeding the petals, from between the lobes of a papillose cavernous disk; filaments shortly free above; anthers minute, didymous.

Upper Guinea. Gaboon river, *Mann !*

A remarkable plant, for the female flowers of which it is very desirable that search should be made.

6. **OCHROCARPUS,** Thouars; Benth. et Hook. f. Gen. Pl. i. 175 and 980.

(*Calysaccion*, Wight, Illust. i. 130.)

Flowers polygamous. Calyx closed before flowering, at length opening in 2 (or sometimes 3) valves or sepals. Petals 4–7 (or more). Stamens indefinite, free or very shortly connate below; filaments filiform; anthers erect, oblong or linear, dehiscing longitudinally. Ovary 2-celled; style short, thick; stigma 2-lobed; ovules 2 in each cell. Fruit baccate, 1–4-seeded. Seeds large; embryo of a large fleshy tigella (radicle), with the cotyledons reduced to a mammilliform projection or 0.—Trees with axillary flowers.

A small tropical genus of Africa and India. I have seen but one African species, of which there are excellent specimens in the Hookerian Herbarium.

1. **O. africanus,** *Oliv.* A tree of 40–50 ft.; the leafy extremities rather compressed. Leaves large, coriaceous, oblong-elliptical, apiculate, cuneately narrowed or rounded at the base; midrib very prominent beneath; lateral parallel veins rather inconspicuous; 6–10 in. long, 2–3½ in. broad; petioles ½–1 in. Flowers about 1½ in. diam., from the nodes of fallen leaves; peduncles solitary or 2 or 3 together, 1–1½ in. long, erect. Calyx opening in 2 orbicular or sometimes in 3 broadly elliptical, somewhat pointed, concave, recurved valves. Petals 4 or more, half as long again as the sepals. Stamens very numerous, shortly connate at the base; anthers linear-oblong, shortly apiculate. Ovary globose, narrowed into a short thick style; stigma 2-lobed, lobes smooth above, recurved; ovules geminate.—*Mammea africana*, Don, Gen. Syst. i. 619?

Upper Guinea. Sierra Leone, *Afzelius!* Prince's Island, *Mann and Barter!* (The above description is taken from Mr. Mann's specimens.)

In the Kew Museum there are fruits labelled "*M. africana?*" received from the late Mr. Barter, which, I think, probably belong to the same species. Externally they are very similar to the fruit of *Mammea americana*, but the outer uniform layer of the pericarp is considerably thicker (¼–½ in.) than in specimens which I have seen of that species. The seeds (1½–2½ in. long, 1–1½ in. diam.) have a hard woody testa, and are closely invested with a fibrous-pulpy layer, of which it is not easy to predicate the origin. The embryo, so far as I can make out, consists of a uniform, hard, fleshy mass, with a short mammilliform extremity; the latter separating easily into equal halves. I incline to regard the mass of the embryo as tigella (radicle), and the 2-partite mamilla as the cotyledons,—precisely the converse of what obtains in *M. americana*, as so carefully described by Messrs. Planchon and Triana, and correctly, as I have myself ascertained. As a similar structure obtains in Indian specimens of *Calysaccion*, which does not appear to differ generically from *Ochrocarpus* of Thouars, I have, with the concurrence of M. Triana, referred the African *Mammea* of Don, to the latter genus; *Ochrocarpus* occupying in the Tribe *Garcinieæ* a relation corresponding to that borne by *Mammea* to the rest of *Calophylleæ*.

ORDER XXIII. TERNSTRŒMIACEÆ (by Prof. Oliver).

Flowers regular, hermaphrodite or rarely unisexual. Sepals usually 5, free or shortly connate, imbricate, the inner often larger. Petals usually 5, free or usually connate below, much imbricate. Stamens indefinite, rarely definite, hypogynous, free or connate and adnate below to the petals; anthers

2-locular, erect, basifixed. Disk 0. Ovary free or rarely ½-inferior, broadly sessile, 3–5–∞-locular; styles as many as cells of the ovary, free or partially or wholly connate; stigma minute, terminal. Ovules solitary, geminate or indefinite. Fruit coriaceous or woody and indehiscent or capsular. Seeds with or without albumen. Embryo variously curved or straight.—Trees or shrubs. Leaves usually coriaceous, alternate, simple, penniveined, serrate or entire, exstipulate (rarely stipulate). Flowers axillary, solitary or fascicled or in terminal or axillary racemes or panicles or springing from the trunk.

A considerable American and Asiatic Order, principally tropical, represented by but three species of different genera in tropical Africa.

Flowers hermaphrodite, axillary, solitary. Ovary few-(4-)celled; ovules numerous . . . . . 1. ADINANDRA.
Flowers unisexual or polygamous, springing from the trunk.
Ovary many-(20- or more-)celled; ovules solitary . . . . . 2. OMPHALOCARPUM.
Flowers hermaphrodite, in a small racemose panicle. Ovary 3-celled; ovules solitary . . . . . 3. CARAIPA.

1. ADINANDRA, Jack; Benth. et Hook. f. Gen. Pl. i. 182.

Flowers hermaphrodite. Sepals 5, broadly imbricate; the outer smaller (passing into the 2 contiguous bracteoles). Petals 5, imbricate, slightly connate at the base or free. Stamens indefinite (in the African species 1-seriate, 25–30, perfectly glabrous), free, inserted with or slightly adnate to the base of the petals (in the species not African, often variously connate); anthers erect, basifixed. Ovary 3–5-celled (sometimes imperfectly); style elongate; stigma entire or minutely 3–5-lobulate; ovules very numerous in each cell. "Fruit indehiscent. Seeds indefinite, small, with a fleshy albumen and inflexed embryo."—Evergreen trees. Leaves alternate. Flowers solitary, axillary, pedunculate.

A small genus, confined, with the following exception, to tropical Asia. The African species differs from the only Asiatic species which I have examined in its glabrous, 1-seriate, free stamens, and may not improbably some day, if other African species turn up, be separated generically.

1. **A. Mannii,** *Oliv.* A glabrous tree of 30 ft. Extremities minutely punctate-tuberculed when dry. Leaves rather coriaceous, oval-oblong, shortly acuminate, more or less rounded or narrowed at the base, minutely dentate-serrulate, especially towards the apex. Peduncles solitary, axillary, at length more or less recurved towards the apex, about ¾ in. long. Flowers 1½ 2 in., glabrous. Sepals apparently 7 (the 2 outermost bracteoles), increasing in size in gradual, broadly imbricating series; inner sepals ¾ in. long, ovate-lanceolate, acute. Petals elongate, linear-oblong, obtuse, at length 3 times longer than the inner sepals, loosely imbricate around the style, not spreading; anthers linear, with a short, truncate-emarginate, terminal apiculus, perfectly glabrous as are the free, subterete, 1-seriate filaments. Ovary 4-celled, gradually tapering into the long slender style, which is apparently articulated below. Stigma obsoletely 4-lobulate. Ovules very numerous. Fruit not seen.

Upper Guinea. Summit of the peak of the island of St. Thomas, *Mann!*

A remarkably fine species, which would be well worth introducing into English greenhouses. It is peculiarly interesting, owing to its affinity with an Indian type and isolated insular locality.

2. OMPHALOCARPUM, P. de Beauv.; Benth. et Hook. f. Gen. Pl. i. 185.

Flowers unisexual (or polygamous?). Sepals 5, coriaceous, rather unequal, much imbricate. Petals 5, exceeding the sepals, connate at the base or connected by the stamens or staminodia, much imbricate. Male fl.: Stamens included, about 25, usually 5 or thereabouts opposite and adnate to the base of each petal; filaments free half their length or more; anthers basifixed, linear-lanceolate, shortly apiculate, shortly 2-lobate at the base, extrorse; squamæ 5, rotundate-cuneate, laciniate, incurved, alternate with and adnate to the petals. Rudiment of ovary depressed-globose, abruptly narrowed into the long slender style, occasionally with one or more cells, containing solitary ovules. Female fl.: Staminodia linear-subulate, some dilated or petaloid. Ovary conical, narrowed into the style, with very numerous radiating cells; stigma terminal, minutely multidenticulate; ovules solitary in each cell. Fruit large, depressed-globose, with a thick pericarp; the inner layer of which consists of crowded, hard, woody nodules; multilocular. Seeds laterally affixed (immature, much flattened), "shining, ovate, compressed, with a fleshy albumen. Cotyledons large, ovate, flat; radicle short, inferior."—A large glabrous tree. Leaves thinly coriaceous, alternate, rather crowded towards the extremities, entire, exstipulate. Flowers fascicled or solitary, subsessile or shortly pedunculate, springing from the trunk, "8–12 ft." above the ground, yellow (*Mann*), rose (*Beauvois*), white (*Thomson*).

A monotypic genus, peculiar to W. tropical Africa. From the limited number of flowers at my disposal, I cannot satisfactorily settle their polygamous character.

1. **O. procera,** *Beauv. Fl. d'Oware*, i. 7. t. 5, 6. A tree of 60–80 ft. (*Mann*). Leaves rather crowded at the ends of the branches, oblanceolate or oblanceolate-oval, contracted to the obtuse or scarcely acute apex, gradually narrowed below to the short petiole or subsessile, 4–10 in. long, 1½–3½ in. broad above the middle. Petals oval-oblong, about ¾ in. long, connate below. Fruit large, depressed-globose, in our specimens 4–6 in. diam., according to Beauvois 12 in.; pericarp of closely-packed woody nodules, about ½–¾ in. thick. I have not seen mature seeds.

Upper Guinea. Oware, *Beauvois;* Camaroons and Bagroo rivers, *Mann!* Old Calabar, *Thomson!*

3. CARAIPA, Aubl.; Benth. et Hook. f. Gen. Pl. i. 188.

Sepals 5, imbricate. Petals 5, contorted. Stamens indefinite, connective usually shortly and broadly produced (in S. American species with a glandular excavation). Ovary 3-celled; style simple; stigma minutely 3-toothed; ovules 2 (or 3) in each cell, pendulous. Capsule (not seen in African species), triangular, dehiscing septicidally. "Seeds exalbuminous; embryo with large flat cotyledons and a superior radicle."—Trees. Leaves alternate, parallel-

veined, with transverse reticulation. Flowers in a small, racemose, subterminal panicle.

A small tropical American genus, to which I refer with little hesitation the species here described from a specimen collected in Nigritania by the late Dr. Baikie. The anthers of this plant remind one very much of those characteristic of *Humiriaceæ*. In other respects the African plant agrees well with *Caraipa*, excepting in the presence of stipules, denoted by their lateral scars. I think, however, there are traces of stipules in at least one Brazilian *Caraipa*.

1. **C.? africana,** *Oliv.* Extremities terete, rugulose, pubescent at first. Leaves coriaceous, broadly elliptical, very obtuse or slightly retuse; base broadly rounded, subcordate, with a gland at the apex of the (subpeltately attached) petiole, puberulous or glabrescent above, shortly and densely hoary-tomentose beneath, lateral veins numerous, parallel, connected by rather obscure transverse veinlets, 2½–3 in. long, 1¾–2 in. broad; petiole subterete, above ½ in. Stipules deciduous. Flowers in a small, tomentose, racemose panicle from the axil of an upper leaf, much shorter than the leaf; short lateral branches of the panicle few-flowered; pedicels equalling or shorter than the sepals. Buds ⅓–½ in. long. Fruit not seen.

Upper Guinea. Niger region, *Dr. Baikie!* (No precise locality.)
The leaves are similar to those of *Dipterocarpeæ* or *Tetracera*, though not scabrous.

Order XXIV. DIPTEROCARPEÆ (by Prof. Oliver).

Flowers regular, hermaphrodite. Calyx 5-fid or 5-partite; lobes imbricate or subvalvate, in fruit usually enlarged, one or more of the calyx-lobes growing out into a wing. Petals 5, contorted, free or slightly connate below. Stamens definite or indefinite, hypogynous or (in *Ancistrocladus*) perigynous; filaments often dilated below, free or slightly connate; anthers 2-celled with equal valves or the inner shorter, dehiscing longitudinally or towards the apex. Ovary free with a broad base or slightly adherent (inferior in *Ancistrocladus*), 3-celled with 2 ovules in each cell or 1-celled with 1 or more ovules. Style entire, 2-fid or 3-fid, rarely styles 3, distinct (*Ancistrocladus*). Fruit free or adherent, indehiscent or dehiscent, 1- rarely 2-seeded. Seed exalbuminous; embryo with equal or unequal, straight or plicate, thick or foliaceous cotyledons, rarely (*Ancistrocladus*) with an abundant folded albumen.—Trees or scandent shrubs, often resinous. Leaves alternate, entire, penniveined, usually with small stipules. Flowers rather small, in axillary or terminal panicles.

An important forest Order in the hottest parts of India and the Archipelago. The remarkable genus *Lophira* is peculiar to Africa.

Tree or shrub. Stamens ∞. Ovary superior, 3-celled. Calyx-segments all enlarged in fruit	1. Vatica.
Tree. Stamens ∞. Ovary superior, 1-celled. Calyx-segments at least 2 enlarged, 1 much more than the other	2. Lophira.
Climbing shrub, usually hooked. Ovary inferior, 1-celled. Styles 3	3. Ancistrocladus.

1. VATICA, Linn.; Benth. et Hook. f. Gen. Pl. i. 192.

Calyx deeply 5-partite; lobes ovate or lanceolate, imbricate; tube very

short or obsolete, adnate to the torus; lobes enlarged in fruit, equal or unequal, usually patent or if ascending not connivent over the fruit. Stamens indefinite (or 15 in Asiatic species); anthers ovate or oblong, rarely linear, with a cuspidate connective or simply acute in bud; cells equal or the outer slightly larger. Ovary 3-celled; ovules usually 2 in each cell; style subulate or terete; stigma entire or 3-toothed. Fruit coriaceous, indehiscent, usually 1-seeded. Seed ovoid or subglobose; cotyledons thick fleshy unequal, or foliaceous and contortuplicate in the following species (*Kirk*).—Tomentose or glabrous trees or (in *V. africana*) frutescent. Leaves entire or repand, penniveined, stipulate. Panicles or racemes terminal or axillary.

A tropical Asiatic genus. The indefinite stamens of the African plant ally it to *Shorea*, to which genus I should have referred it were it not for its spreading calyx-lobes in fruit.

1. **V. africana,** *Welw. in Linn. Trans.* xxvii. (*ined.*) *t.* 5. A shrub or sometimes arborescent, attaining 20 ft.; extremities tomentose-pubescent, rarely glabrous. Leaves petiolate coriaceous oblong-elliptical obtuse or sometimes retuse, with or without a mucro, narrowly rounded or subcordate at the base, glabrescent above, closely rusty- or cinnamon-tomentose beneath, rarely glabrous; midrib and primary parallel lateral veins very prominent beneath, 1½–4 in. long, ¾–1¾ in. broad; petiole ¼–¾ in. Flowers in few-flowered axillary racemes shorter than the leaves or crowded or variously fascicled towards the extremities. Bracts lanceolate or ovate-lanceolate, deciduous. Sepals free nearly or quite to the base, ovate, obtuse, subequal, distinctly imbricate. Petals three times as long, oblong-lanceolate, thinly pilose within. Stamens indefinite, bi-(or pluri-)seriate; filaments filiform; anthers dorsally affixed, short, elliptical, with equal cells, pointed or subapiculate. Ovary hairy. Fruit "1- or 2-seeded;" globose, subapiculate; calyx-lobes free nearly to the base, patent or ascending, oblanceolate, oblong or obovate-oblong, obtuse or subacute, longitudinally nerved and coarsely reticulated, 1–1¾ in. long. "Cotyledons foliaceous, equal, applied to each other, lobed at base, contortuplicate; radicle superior" (*Dr. Kirk*).

Var. *laxa.* 5–7 ft. Leaves usually from 2–2½ in. long. Flowers in loose, axillary, few-flowered racemes; pedicels often ¼ in.; and

Var. *hypoleuca.* Leaves 3½–5½ in. long, retuse, closely whitish-tomentose beneath. Pedicels ¼ in. Both forms in—

Lower Guinea. Huilla, Angola, *Dr. Welwitsch!*

Var. *glomerata.* 20 ft. Leaves often larger. Flowers closely fascicled.

South Central. Eastern slope of Batoka Hills, *Dr. Kirk!*

Var. *glabra.* Shrub of 4 ft. Leaves glabrous; petiole ⅛ in. Western slope of same hills, *Dr. Kirk!*

The Batoka specimens are not in a good state for comparison, so that, notwithstanding the differences indicated, it would be premature to make more than one species.

2. **LOPHIRA,** Banks; Benth. et Hook. f. Gen. Pl. i. 192.

Calyx deeply 5-partite; segments rotundate, broadly imbricate, of the fruit at least 2 enlarged, 1 three to four times longer than the other, rigid, wing-

like. Petals dilated above, 2-fid or retuse. Stamens indefinite; anthers narrow-linear, unappendaged; valves equal, dehiscing longitudinally near the apex. Ovary 1-celled, elongate-conical; style shortly 2-fid with patent recurved lobes; ovules about 8–12 on a free central column, erect. Nut oblong, tapering above, 1-seeded. Seed erect. Cotyledons fleshy, connate nearly throughout, narrow-oblong, radicle very shortly exserted, inferior.—A large tree. Leaves elongate, rather coriaceous, entire, narrowed to the base, with numerous parallel lateral veins, glabrous. Stipules minute, triangular, caducous. Flowers in terminal pyramidal panicles.

A remarkable monotypic genus confined to intertropical Africa, though occurring both in the east and west.

1. **L. alata,** *Banks in Gærtn. Fruct.* iii. 32. *t.* 188. Leaves elongate-oblanceolate, usually obtuse, emarginate or retuse, often more or less crispate-undulate, narrowed to the base, 8–30 in. long, 2–5 in. broad; petiole varying up to 2½ in., often very short or leaves subsessile. Flowers white (*Mann*), yellow (*Guill. et Perr.*), about 1–1½ in. across. Larger wing of the fruit erect, coriaceous, broadly oblong-lanceolate or obliquely linear-oblong, 3–4½ in. long, with longitudinal anastomosing usually obscure nerves, "crimson" (*Barter*). Nut about 1–1½ in. long.—Guill. et Perr. Fl. Seneg. t. 24. *L. simplex,* Don, Gen. Syst. i. 814.

Upper Guinea. Senegambia! Sierra Leone, *Don;* Niger, *Barter!* Ambas Bay, *Mann!*

Nile Land. Madi, White Nile, *Speke and Grant!*

Captain Grant says the leaf is used as a charm. In Western Africa the fruit-calyx is worn as an ornament by the native women.

3. ANCISTROCLADUS, Wall.; Benth. et Hook. f. Gen. Pl. i. 191.

Calyx deeply 5-partite or sepals free, imbricate in æstivation; lobes enlarged in fruit, unequal. Stamens 5–10, perigynous; filaments free or shortly connate or adnate to the base of the petals; anthers 2-celled; valves equal or rather unequal. Ovary 1-celled, inferior, with a solitary erect or laterally affixed ovule, crowned by the shortly cylindrical elevated fleshy disk bearing 3 articulated styles; stigmas (terminal in the African species). Fruit adnate to the turbinate calyx-tube, surmounted by the enlarged wings (calyx-lobes). Seed subglobose. Embryo straight, clavate; cotyledons subfoliaceous, divergent. Albumen fleshy, in closely folded convolutions.—Climbing glabrous shrubs; branches usually furnished with hooks. Leaves entire or denticulate, rather coriaceous, penniveined. Panicles terminal with divaricate often recurved branches.

A small genus confined to tropical Asia and the Archipelago, with the exception of the following. *A. guineensis* is very nearly allied to Malayan species, but of none of the Asiatic species have I had the opportunity of examining well-developed flowers, and I believe the discrepancy between the description of the pistil as given above and in the Gen. Plantarum is due to the circumstance that imperfect drawings or descriptions were relied upon in preparing the latter. We have numerous good flowers of the African species but no fruits, and the description of the embryo I have borrowed from Mr. Thwaites' careful account of it (Linn. Trans. xxi. 225).

The genus *Ancistrocladus* does not appear to me to have any affinity with *Dipterocarpeæ*, though the analogy, in respect of the accrescent calyx and inflorescence, is curious. If *Gyrocarpeæ* be rightly included in *Combretaceæ*, perhaps *Ancistrocladus* might be appended to that family as another anomalous ally.

1. **A. guineensis,** *Oliv.* A climbing shrub attaining 10–15 ft. Leaves crowded at the extremities, broadly-oblanceolate, obtuse, narrowed to the petiole, repand-denticulate or entire, 4–9 in. long, 1½–3 in. broad; petiole deeply channelled or narrowly winged, varying up to ¾ in., exstipulate. Flowers small, in broadly spreading dichotomous terminal panicles exceeding the leaves. Sepals ovate, obtuse, 3 inner rather larger. Petals patent, recurved, twice as long as the sepals, broadly obovate-elliptical. Filaments glabrous, thickened below, very shortly connate and adnate to the base of the petals though easily separable, subulate and recurved above; anthers small, broad, muticous. Styles 3, distinct, articulated on the apex of a short, raised, columnar, fleshy, epigynous disk, caducous; stigmas subreniform-capitate. Fruit not seen.

Upper Guinea. Old Calabar, *Mann!*

There is a specimen of the leafy extremity of a branch of an *Ancistrocladus* in the Kew Herbarium, from the Niger (*Barter*), perhaps distinct from the above. It bears a strongly curved hook and the leaves are larger and more acute.

Order XXV. MALVACEÆ (by Dr. Maxwell T. Masters).

Flowers regular, hermaphrodite. Sepals 5, conjoined below, valvate in æstivation. Petals 5, hypogynous, adnate to the base of the column, twisted in the bud. Stamens numerous, monadelphous. Column either truncate, or toothed at the apex, or at other times dividing into numerous filaments. Anthers oblong globose or reniform, spuriously 1-celled, bursting longitudinally. Thalamus (columella) more or less prolonged between the carpels. Ovary 2- or usually many-celled, entire or lobed. Carpels verticillate. Style simple below, divided above, rarely entirely undivided; stigmas capitate linear or grooved; ovules 1–∞, attached to the inner angle of the carpels, curved, ascending or horizontal. Fruit dry, rarely somewhat fleshy, of few or many indehiscent or more or less 2-valved carpels, which separate when ripe from the columella or form a true, many-celled, loculicidal capsule. Seeds reniform or subglobose, smooth, tubercled, downy, or provided with cottony hairs. Albumen generally scanty, sometimes abundant. Embryo more or less curved. Cotyledons flat or folded, often wrapping round the radicle.—Herbs or soft-wooded trees or shrubs, their surface often covered with soft stelliform pubescence. Leaves alternate, rarely sessile, usually palminerved, entire or more or less deeply lobed. Stipules free, deciduous or persistent. Inflorescence definite. Flowers usually stalked, rarely sessile; flower-stalks axillary solitary or fasciculate, often arranged in terminal leafy or ultimately leafless clusters. Bractlets wanting or 2–3, or more, free or adnate to the calyx, distinct from each other or connate forming an epicalyx or involucel.

A large and important Natural Order whose members are found throughout the world except in the Arctic regions. The monadelphous stamens, one-celled anthers, and valvate

calyx, furnish good marks of distinction. Mallow-worts are for the most part mucilaginous, many of them supply valuable fibre, while from the seeds of various species of *Gossypium*, cotton is obtained, which gives the Order a special interest in an economical point of view.

TRIBE I. **Malveæ.**—*Staminal column provided with anthers to the top or nearly so. Styles as numerous as the cells of the ovary or as the ripe carpels. Ripe carpels usually seceding from the columella. Cotyledons leafy, usually folded. Herbs or undershrubs.*

Bractlets 3, rarely wanting.
- Stigmas linear . . . . . 1. MALVA.
- Stigmas capitate . . . . . 2. MALVASTRUM.

Bractlets none.
- Carpels either without awns, or if with awns having their points erect or inflexed. Ovule solitary . . . . . 3. SIDA.
- Carpels awnless or with divergent awns. Ovules usually more than one.
  - Carpels divided into two compartments by a transverse partition 4. WISSADULA.
  - Carpels 1-celled without any transverse partition . . . . . 5. ABUTILON.

TRIBE II. **Ureneæ.**—*Staminal column destitute of anthers at the summit, which is truncate or 5-toothed. Styles twice as numerous as the cells of the ovary or the carpels. Ripe carpels seceding from the columella. Herbs or undershrubs.*

- Flowers in dense heads intermingled with distinct bractlets and surrounded by a general involucre . . . . . 6. MALACHRA.
- Flower-heads not involucrate. Bractlets connate. Carpels with hooked spines . . . . . 7. URENA.
- Flowers rarely capitate. Bractlets distinct or connate. Carpels awned or muricate, but never with hooked spines . . . . . 8. PAVONIA.

TRIBE III. **Hibisceæ.**—*Column usually destitute of anthers at the summit, which latter is either truncate or 5-toothed. Styles as many as the carpels. Carpels not seceding when ripe, but forming a loculicidally dehiscent capsule. Herbs shrubs or trees.*

Style ultimately dividing into stigmatic branches.
- Capsule 5-celled. Herbs or shrubs.
  - Bractlets usually numerous, rarely wanting. Ovary with a single seed in each cell. Capsule pentagonal . . . . . 9. KOSTELETZKYA.
  - Bractlets 3, large, cordate, membranous. Cells of ovary biovulate . . . . . 10. SENRA.
- Bractlets numerous, rarely wanting. Ovules numerous . . . 11. HIBISCUS.

Style club-shaped at the apex, undivided or nearly so.
- Bractlets narrow.
  - Calyx 5-cleft. Ovary 3–4-celled . . . . . 12. FUGOSIA.
  - Calyx truncate. Ovary 5-celled . . . . . 13. THESPESIA. (See *Gossypium anomalum*.)
- Bractlets 3, cordate, broad. Calyx truncate . . . . . 14. GOSSYPIUM.

TRIBE IV. **Bombaceæ.**—*Staminal column divided at the apex into 5–8 divisions, each of which bears one or many anthers, rarely nearly undivided. Anthers free, reniform or adnate, globose, linear or anfractuose. Style entire or shortly divided into as many branches as there are cells in the ovary. Carpels combined into a dehiscent capsule or an indehiscent pod. Trees.*

Leaves digitate. Bractlets distinct or none. Cotyledons twisted.
- Staminal column divided at the apex into numerous filaments.
  - Calyx 5-cleft. Fruit indehiscent . . . . . 15. ADANSONIA.
  - Calyx truncate or nearly so. Fruit dehiscent . . . . . 16. BOMBAX.
- Staminal column divided at the apex into 5 divisions . . . . . 17. ERIODENDRON.

1. MALVA, Linn.; Benth. et Hook. f. Gen. Pl. i. 201.

Epicalyx of 3 distinct bracts. Calyx 5-cleft. Petals obcordate. Staminal column divided at the summit into ∞ filaments. Ovary many-celled, each cell with a single ovule. Styles as numerous as the cells of the ovary; stigmas linear, running down the inner side of the style. Ripe carpels obtuse, indehiscent, arranged in an umbilicate whorl around a central axis from which they ultimately separate. Ovule curved. Radicle inferior.—Herbs with soft lobed leaves. Flowers purplish, in axillary fascicles.

A genus consisting, so far as tropical Africa is concerned, of two species.

Stem erect. Flowers in dense clusters . . . . . 1. *M. verticillata.*
Stem trailing; clusters few-flowered . . . . . 2. *M. parviflora.*

1. **M. verticillata,** *Linn.; DC. Prod.* i. 433. Annual or perennial, with an erect, furrowed, branched stem, 2–4 ft. high. Leaves on long stalks, cordate, roundish, 5–6-lobed; lobes acute or blunt, crenate-serrate, more or less densely covered with stelliform hairs on both surfaces. Flowers in dense axillary or terminal clusters, sessile or shortly stalked. Epicalyx of three linear, ciliolate bracts. Calyx twice the length of the bracts, bell-shaped, 5-cleft; lobes triangular, acute. Petals oblong, 2-fid; lobes rounded, slightly exceeding the sepals. Carpels 10–12 in a whorl, enclosed within the accrescent calyx, each one reniform, 3-sided; back marked with a central prominent nerve, sides with thickened radiating veins.

Nile Land. Abyssinia, *Schimper, Petit!*

This plant has a wide range, being found in India, the mountains of Dahuria, in Amoorland and Egypt, and it has been introduced into Britain with foreign seeds, etc.

2. **M. parviflora,** *Linn.; DC. Prod.* i. 431. An annual plant with slightly hairy or nearly glabrous trailing stems. Leafstalks 3–4 in. long, with a few simple hairs near the top. Leaves cordate, orbicular, palmately nerved, slightly 3–5-lobed, crenate-dentate. Flowerstalks axillary, spreading, much shorter than the leaves. Bracts linear. Sepals ovate or roundish, mucronate, spreading, accrescent. Carpels hairy or smooth, transversely netted, rugose.

Nile Land. Nubia, *Ehrenberg!*

This species is found in the Levant, Persia, Affghanistan, and also in Central Arabia.

2. MALVASTRUM, A. Gray; Benth. et Hook. f. Gen. Pl. i. 201.

Epicalyx of 1–3 distinct bractlets or wanting. Calyx 5-lobed. Staminal column divided at the apex into numerous filaments. Cells of the ovary 5 or more, each with a single ovule. Styles equal in number to the cells of the ovary, filiform or club-shaped, with small, terminal, capitate stigmas. Ripe carpels separating from a short columella, indehiscent or somewhat 2-valved, pointless or provided with two erect beaks. Seed ascending, reniform.—Herbs or undershrubs. Leaves entire or divided. Flowers red or yellow, stalked or nearly sessile, axillary or arranged in terminal spikes.

A large genus, the majority of whose species are American, the 2 African species being found also widely distributed throughout the tropics of both hemispheres.

Tomentum stellate. Flowers in terminal spikes . . . . . 1. *M. spicatum.*
Hairs appressed, parallel. Flowers mostly axillary. Calyx broad . 2. *M. tricuspidatum.*

1. **M. spicatum,** *A. Gray, Plant. Fendler.* 22. An erect branching herb, 1–2 ft. high, stellately tomentose. Leaves stalked, 1–2 in. long, ovate, acute or obtuse, crenate-serrate, sometimes 3-lobed. Flowers small, yellow, in a dense, terminal, leafy spike. Bracts of epicalyx narrowed, shorter than the calyx. Sepals acuminate, ciliate. Petals 4–5 lines long. Carpels 8–12, angular, pubescent.—*Malva spicata,* Linn.; DC. Prod. i. 430.

Nile Land. Sennar, *Kotschy!*

Very generally distributed throughout the tropics, and found also in Australia, the Cape de Verde Islands, etc.

2. **M. tricuspidatum,** *A. Gray, Plant. Wright.* 16. An erect, branching, herbaceous plant, 2–3 ft. high, covered with appressed simple hairs. Leaves on longish stalks, ovate-lanceolate, irregularly toothed, hairy, 1–2 in. long. Flowers yellow, nearly sessile, in axillary and terminal clusters. Epicalyx of 3 narrow bracts. Calyx 5-lobed. Carpels 8–12, closely packed, each carpel reniform, with 3 small points at the upper edge.—*Malva tricuspidata,* Ait.; DC. Prod. i. 430. *Malvastrum coromandelinum,* Garcke in Schweinf. Fl. Æthiop. 267.

Nile Land. Sennar, *Kotschy!*

Like the preceding, this plant is widely distributed throughout the tropics of both hemispheres, also in Australia.

3. SIDA, Linn.; Benth. et Hook. f. Gen. Pl. i. 203.

Epicalyx usually wanting. Calyx 5-lobed. Petals oblique. Staminal column divided at the top into several filaments; ovaries 5 or more, in a ring round the axis; styles as many as the carpels; stigmas terminal. Ripe carpels separating from the axis and provided with two connivent or more or less erect awns, or in some of the species destitute of those appendages, dehiscing by a little chink at the summit. Seed pendulous or horizontal; radicle superior.—Herbs or shrubs, more or less hairy, rarely smooth. Flowers small, on 1-flowered solitary axillary stalks, or clustered in heads or racemes.—*Diclyocarpus,* Wight in Ann. Sc. Nat. Ser. 2. xi. 169.

A large genus, whose species are widely distributed throughout the warmer regions of the globe.

Flowers in loose terminal corymbs. Leaves linear-lanceolate . . . 1. *S. linifolia.*
Flowers numerous, in dense axillary clusters . . . . . 2. *S. urens.*
Flowers few, in loose axillary clusters or aggregated at the ends of the branches.
  Leaves deeply palmately divided . . . . . 3. *S. triloba.*
  Leaves not palmate.
    Stem prostrate or decumbent.
      Branches slender, filiform, often trailing. Leaves not retuse . 4. *S. humilis.*
      Branches woody, intricate. Leaves retuse . . . . . 5. *S. truncata.*
    Stem erect.
      Leaves smooth or nearly so on both surfaces . . . . . 6. *S. carpinifolia.*
      Leaves hairy, at least on the under surface.
        Carpels 5. Petiole spiny . . . . . 7. *S. spinosa.*
        Carpels more than 5.
          Awns of ripe carpels, erect, longer than the deltoid calyx-lobes . . . . . 8. *S. cordifolia.*

Awns of ripe carpels equal to or shorter than the calyx-lobes.
Leaves tapering at the base, smooth above, downy below . . . . . 9. *S. rhombifolia.*
Leaves roundish ovate-cordate, downy above and below; carpellary awns inflexed . . . . . 10. *S. grewioides.*

1. **S. linifolia,** *Cav. Diss.* i. 14. *n.* 23. *t.* 2. *f.* 11. Annual or biennial, with an erect, terete, pilose stem, branched from near the base, 1½–2 ft. high. Leaves scattered, on short stalks; blades linear-lanceolate, varying much in size, entire or rarely minutely toothed; stipules half the length of the petiole, linear, foliaceous. Flowers stalked, in lax, terminal, corymbose cymes. Calyx cup-like, 5-cleft; lobes deltoid, pilose. Petals white or crimson, twice the length of the sepals. Carpels 5 or 6, blackish, scarcely beaked, 3-sided, inner sides reticulate; back furrowed.—*S. linearifolia*, Schum. and Thonn. Pl. Guin. 303.

Upper Guinea. Niger, *Barter!* Cape Coast, *T. Vogel!* Quorra; Accra; Senegambia, *Perrottet!* Sierra Leone, *Afzelius! Don!*
Lower Guinea. Congo, *Smith!*
Occurs also in the West Indies and on the north-eastern coast of S. America.

2. **S. urens,** *Linn.; DC. Prod.* i. 465. Perennial, with erect or trailing, hirsute branches; leafstalks as long as the leaves, which are cordate, ovate, acute, serrate, more or less densely clothed with stellate hairs on both surfaces. Flowers usually in dense clusters at the extremity of the branches, rarely solitary, axillary. Calyx hispid, angular, cup-shaped, 5-cleft; segments acuminate. Carpels 5, not reticulated, awnless or with short beaks.—? *S. debilis*, Don, Gen. Syst. i. 499. ? *S. sessiliflora*, Don, l. c. i. 499. ? *S. densiflora*, Rich. Fl. Abyss. i. 66.

Upper Guinea. West coast, *Don!* Senegambia, *Heudelot! Perrottet!*
Nile Land. Sennar, *Kotschy!* Kordofan, White Nile, *Petherick!*
Lower Guinea. Congo, *Burton! Smith!*
A widely distributed plant, occurring in the Cape de Verde Islands, Madagascar, the West Indies, Peru, Brazil, etc.
Judging from the description, Richard's *S. densiflora* belongs here.

3. **S. triloba,** *Cav.; DC. Prod.* i. 466; *Cav. Diss.* i. *t.* 1. *f.* 2 *and t.* 131. *f.* 1. Suffruticose, glabrous, 2–3 ft. high. Leaves on long stalks, very variable in form, cordate, palmately 3–5-lobed; lobes ovate, acuminate, serrate; the central lobe longer than the rest. Stipules leafy, oval-lanceolate. Flowers small, on long axillary stalks. Calyx broadly bell-shaped, deeply divided into 5-pointed lobes, which are at first erect, but afterwards become patent. Petals whitish, exceeding the calyx. Carpels 8–10, in a depressed ring, glabrous, with a very short beak, directed inwards.—*S. permutata*, Hochst. Pl. Schimp. Abyss. *Pavonia crenata*, Hochst. in Schimp. Pl. Abyss.

Nile Land. Abyssinia, *Schimper! Roth! Dillon and Petit!*
The plant also occurs in various parts of S. Africa.

4. **S. humilis,** *Cav.; DC. Prod.* i. 463. A trailing annual or biennial plant, with a cylindrical procumbent stem branched from near the base; branches erect, with a few scattered, stellate or simple hairs. Leaves stalked, roundish, acuminate, crenate-serrate, hairy on both surfaces; stipules linear

lanceolate. Flowers axillary, solitary or twin, stalked; pedicels exceeding the leaves or sometimes shorter, articulated. Calyx 5-parted; segments triangular, very acute. Corolla straw-coloured, scarcely exceeding the calyx. Carpels 5, shortly bicuspidate, not reticulated on the surface.—Cav. Diss. v. 277. n. 402. t. 134. f. 2.

Upper Guinea. Niger, *Barter!*
Lower Guinea. Congo? *Burton!*
Mozamb. Distr. Lake Nyassa, *Dr. Kirk!*

Found also in India, China, Bourbon, etc. Dr. Kirk's specimens, from Lake Nyassa, have palmately 3-lobed leaves, and the awns are more bent inwards, but these characters are scarcely sufficiently important without other warranty to establish a new species.

5. **S. Schimperiana,** *Hochst. in Rich. Fl. Abyss.* i. 66. Perennial, with a very thick woody rootstock, from the summit of which proceed a large number of procumbent or erect repeatedly forked branches, 6–12 in. long. Leafstalk shorter than the leaves, which are small, ½ in. long, oblong, retuse, cuneate at the base, sparsely covered with stellate hairs; stipules small, ligulate. Flowers solitary, axillary, on very short jointed stalks, which are sometimes crowded towards the end of the branches. Calyx cyathiform, 5-cleft; lobes triangular; corolla pink. Fruit globular, of 5 glabrous, 1-seeded, slightly beaked carpels (beak bent inwards) dehiscing along the inner edge.—*Dictyocarpus truncatus,* Wight in Ann. Sc. Nat. Ser. 2. xi. 169.

Nile Land. Abyssinia, *Schimper! Dillon and Petit!* Karague hills, *Speke and Grant!*
Found also in India.

6. **S. carpinifolia,** *Linn.; Cav. Diss. t.* 2. *f.* 3; *t.* 3. *f.* 10, 11; *t.* 134. *f.* 1. Perennial, with an erect cylindrical or slightly pilose much branched stem. Leaves on short stalks, linear-lanceolate, serrate, smooth on both surfaces. Stipules linear, leafy, as long as or longer than the leafstalks. Flowerstalks axillary, as long as or longer than the petioles, solitary or twin, rarely tufted, 1-flowered, jointed in the middle. Calyx globular, smooth, 5-cleft; segments triangular, acute. Petals twice the length of the calyx, spreading, pale yellow. Carpels 7 or 8, rugose, veined at the sides and provided with two awns.—*S. acuta,* Cav.; DC. Prod. i. 460. *S. stipulata,* Cav.; Hook. f. Fl. Nigrit. 231. *S. rugosa,* Schum. et Thonn. Pl. Guin. 304. *S. ovata,* Don, Gen. Syst. 492. *S. prostrata,* Don, Gen. Syst. 490. *S. Vogelii,* Hook. f. Fl. Nigrit. 231.

Upper Guinea. Sierra Leone, Cape Coast, and Fernando Po, *T. Vogel!* St. Thomas, *Don!*

Found also in India, New Granada, Mauritius, the Cape de Verde Islands, and subject to great variation in stature, hairiness, etc.

7. **S. spinosa,** *Linn.; DC. Prod.* i. 460. Annual or perennial with long erect or trailing branches covered with stellate pubescence. Leafstalks nearly as long as the leaves, often provided at the base with a small hooked tubercle. Leaves cordate, oblong-lanceolate or ovate, obtuse, serrate, nearly smooth above, downy beneath. Flowerstalks axillary, solitary or clustered, jointed about the middle, longer than the leafstalks. Calyx cup-shaped, 10-ribbed, 5-cleft; lobes deltoid. Craples 5, somewhat membranous, slightly

reticulate, with 2 short awns, and bursting irregularly toward the base.—*S. scabra*, Schum. et Thonn. Pl. Guin. 305. *S. alba*, Linn. Sp. 960. *S. alnifolia*, Linn. Sp. 960.

Upper Guinea, *Thonning.*
Nile Land. Nubia, *Kotschy!* White Nile, *Petherick!* Abyssinia, *Schweinfurth!* Unyoro, *Speke and Grant!*
Lower Guinea. Congo, *Smith!*
Mozamb. Distr. Sennar, *Dr. Kirk!*
A common tropical weed much resembling some of the forms of *S. rhombifolia*, but distinguishable by the smaller number of carpels. The hooked spine from which the plant derives its name is not always present.

8. **S. cordifolia,** *Linn.; DC. Prod.* i. 461. Perennial with an erect cylindrical stem, 4–5 ft. high, dividing into a few obliquely ascending branches. Leaves stalked, oblong-obtuse, very downy on both sides, crenate at the margins, 1½–2 in. long, 1–1½ in. broad. Petiole equal to the blade. Stipules minute, linear, hairy, half the length of the petiole. Flowers small, yellow, the lower ones on long axillary stalks, the upper ones nearly sessile and aggregated together at the end of the stem and branches so as to form a dense panicle. Calyx globose, 10-ribbed, 5-cleft; segments triangular, downy. Petals yellow, twice the length of the sepals. Carpels 10 in a whorl, each three-sided; back furrowed, sides with a raised network of veins; apex prolonged into long erect awns covered with reflected hairs and projecting beyond the persistent calyx.—*S. althæifolia*, Swartz, Guill. et Perr. Fl. Seneg. i. 73. *S. africana*, Beauv. Fl. Owar. ii. 87. *S. decagyna*, Schum. et Thonn. Pl. Guin. 307.

Upper Guinea. Niger, *Barter!* W. Africa, *Don!* Senegambia, *Perrottet! Vogel!* Cape Coast, *T. Vogel!*
Nile Land. White Nile, *Petherick!* Nubia, *Kotschy! Speke and Grant!*
Lower Guinea. Congo, *Burton!*
Mozamb. Distr. Shamo, *Dr. Kirk!* Lower Shire Valley, *Dr. Meller!* Zanzibar, *Bouton!* Mozambique, *Forbes!*
A common tropical weed found also at the Cape, in Natal, and Mauritius. It has had a separate name at the hands of almost every collector or botanist. Only those referring to Africa are above cited.

9. **S. rhombifolia,** *Linn.; DC. Prod.* i. 462. A much-branched rarely glabrous perennial, varying much in stature and form of leaf. Leaf-stalks short. Leaves ovate or lanceolate, usually cuneate at the base, sometimes rounded, slightly serrated, smooth above, more or less downy beneath. Flowers solitary, on long, axillary, jointed stalks or clustered at the ends of the branches. Calyx 10-ribbed, 5-cleft; segments deltoid or acuminate. Carpels 9–10, smooth or slightly reticulate, shortly bi-aristate, rarely muticous, opening by a small chink at the top.—*S. riparia*, Hochst. Pl. Schimp. Abyss. *S. ostryæfolia*, Webb, Frag. Fl. Æthiop. 49.

Upper Guinea. St. Thomas, *Don!* Niger, *Barter! Vogel!* Senegambia, *Heudelot! Perrottet!*
Nile Land. White Nile, *Petherick!* Unyoro, *Speke and Grant!*
Lower Guinea. Congo, *Smith!*
A very variable plant, widely diffused throughout the tropics. Webb, l. c., describes his plant as having one-awned indehiscent carpels; probably merely an accidental occurrence, as

on the same plant I have seen carpels with two distinct awns, or with one (from cohesion of two) and sometimes none at all.

10. **S. grewioides,** *Guill. et Perr. Fl. Seneg.* i. 71. Suffrutescent, erect. Branches covered with stellate tomentum. Leafstalks shorter than the oblong, obtuse or roundish, crenate leaves, which are downy on both surfaces. Flowers small, yellow, on solitary or geminate axillary peduncles, which are shorter than the petioles. Calyx globose, 10-ribbed, 5-cleft; segments roundish or obovate, cuspidate. Carpels 7–8, indehiscent, beaked or beakless; beaks inflexed, reticulate at the sides.—*S. subrotunda*, Hochst. Pl. Schimp. Abyss.

Upper Guinea. Senegambia, *Perrottet!*
Nile Land. Sennar, *Kotschy!* Cordofan, *Kotschy!* Abyssinia, *Schimper!*
Mozamb. Distr. Mozambique, *Forbes!* Lupata, *Dr. Kirk!* Querimba, *Peters!*
Found also at Kurrachee by Stocks, and in Arabia by Ehrenberg. Garcke in Peters' Mossamb. Bot. p. 128, mentions a form with more robust stem and larger leaves.

In addition to the preceding there is a figure and description of *S. patens* in Andr. Bot. Rep. t. 571, said to have come from Abyssinia, but which I have failed to identify.

4. WISSADULA, Medik; Benth. et Hook. f. Gen. Pl. i. 204.

Bractlets none. Calyx 5-cleft. Ovary 5-celled, each cell with 2–3 or rarely a solitary ovule; stigmas 5, capitate. Fruit truncate above, of 5 carpels partially connate below, divergent and pointed or beaked above, divided internally by a transverse false dissepiment and splitting into 2 valves when ripe. Seeds 1–2, pendulous in the lower part and ascending or rarely none in the upper portion of the fruit.—A small shrub with cordate leaves and small, paniculate, yellow flowers.

The genus differs from *Abutilon* and *Sida* in the false partition that crosses the carpellary cavity, and from *Sida* in the divergent, not erect, carpellary beaks.

1. **W. rostrata,** *Planch. in Fl. Nigrit.* 229. An undershrub, thinly covered with stellate hairs. Leaves, except the uppermost, on long stalks, cordate-ovate, acuminate, nearly entire, smooth above, downy and white below. Stipules linear, subulate. Inflorescence a large, loose, panicled cyme. Calyx 5-cleft. Corolla yellow, exceeding the calyx. Carpels 5, when ripe three times the length of the calyx, united below, free above, each one bursting above by two valves and divided by a false partition into two halves. Seeds pendulous or ascending, the lower ones often much more tomentose than the upper.—*S. rostrata*, Schum. et Thonn. Pl. Guin. 306. *Abutilon luxiflorum*, Guill. et Perr. Fl. Seneg. i. 66. *A. periplocifolium*, Don, Gen. Syst. i. 500; Webb, Spicil. Gorgon. 108. *S. periplocifolia*, Linn.; DC. Prod. i. 467. *W. heterosperma*, Hochst. in Pl. Schimp. Abyss. *S. heterosperma*, Hochst. in Pl. Kotsch. Nub.

Upper Guinea. Gold Coast, *Vogel!* St. Thomas, *Don!* Senegambia, *Perrottet!* Niger, *Barter!*
Nile Land. Nubia, *Kotschy!* Abyssinia, *Schimper!* Kordofan, *Cienkowski;* Sennar, *Heughlin;* White Nile, *v. Harnier.*
Lower Guinea. Congo, *Smith!*

Mozamb. Distr., *Dr. Meller!*
Found also in the W. Indies, Brazil, and perhaps in India.

5. ABUTILON, Gærtn.; Benth. et Hook. f. Gen. Pl. i. 205.

Bractlets 0. Calyx 5-cleft. Column divided at the apex into numerous filaments. Ovary 5–∞-celled, each with 1–3 or rarely more ovules. Styles as many as the cells of the ovary. Ripe carpels united at the base or separate, rounded, beaked or truncate at the summit. Seeds reniform, ascending or horizontal.—Herbs or shrubs covered with down. Leaves cordate, angled or lobed. Flowers axillary or terminal.—DC. Prod. i. 467, sect. *Sidæ*.

A widely distributed genus whose species are found throughout the tropics of both hemispheres. It is, however, only artificially separated from *Sida* in the carpellary awns being directed outwards, not upwards, and in the possession usually of more than one ovule in each cell of the ovary. This latter is, moreover, an uncertain mark of distinction. The number of carpels is generally greater in *Abutilon* than in *Sida*.

In India, with the exception of *A. fruticosum*, the species of *Abutilon* expand their flowers in the evening; the *Sidas*, on the other hand, flower in the daytime.

Ripe carpels rounded or reniform at the top.
- Branches (especially the upper ones) angular . . . . . 1. *A. angulatum.*
- Branches usually terete.
  - Carpels rounded, awned.
    - Peduncles as long as or longer than the adjacent leaf . . . 2. *A. asiaticum.*
    - Peduncles shorter than the adjacent leaf. Stem downy and villose . . . . . 3. *A. graveolens.*
  - Carpels rounded, without awns.
    - Flowers in large, loose, terminal, much-branched panicles. . 4. *A. longicuspe.*
    - Flowers solitary, axillary, or, if panicled, densely so, and with short pedicels.
      - Plant downy . . . . . 5. *A. glaucum.*
      - Plant downy and with spreading hairs . . . . . 3. *A. graveolens.*

Ripe carpels acute at the top, prolonged into 2 long awns.
- Ripe carpels with (ultimately) long spreading points.
  - Ripe fruit cylindrical, much longer than the calyx . . . . . 6. *A. macropodum.*
  - Ripe fruit pateriform, not more than twice as long as the calyx.
    - Leaves ovate, acuminate, downy . . . . . 7. *A. zanzibaricum.*
    - Leaves 3-lobed, hispid . . . . . 8. *A. ramosum.*
- Ripe carpels with erect, not spreading points . . . . . 9. *A. indicum.*

Ripe carpels truncate, with short prolonged points.
- Flowers small. Calyx shorter than the ripe fruit . . . . . 10. *A. bidentatum.*
- Flowers large (½ in. across). Calyx nearly equal to the ripe fruit. 11. *A. hirtum.*

Ripe carpels not seceding from the axis, truncate, acute, but without prolonged points.
- Calyx deeply 5-cleft, villose . . . . . 12. *A. auritum.*
- Calyx shortly 5-cleft, downy . . . . . 13. *A. fruticosum.*

1. **A. angulatum,** *Mast.* A tall perennial with angular branches, covered with whitish down. Leafstalks longer than the leaves, which are roundish, cordate, acute or acuminate, slightly serrated, 5–7-nerved, paler on the lower than on the upper surface. Stipules subfalcate, reflexed. Panicle terminal, loose, much branched, ultimately leafless. Peduncles jointed, shorter than the petioles. Calyx cup-shaped, 5-cleft; segments ovate, acute, submucronate, much shorter than the yellowish corolla. Fruit subglobose,

depressed, umbilicate, twice the length of the persistent calyx. Carpels about 20, submembranous, obtuse, reniform, 1-seeded.—*Bastardia angulata*, Guill. et Perr. Fl. Seneg. 65. *A. intermedium*, Hochst. Pl. Schimp. Abyss.

Upper Guinea. Senegal, *Perrottet!*
Nile Land. Abyssinia, *Schimper! Dillon et Petit!*
Lower Guinea. Congo, *Smith!*
Mozamb. Distr., *Dr. Meller!* Zambesi, *Dr. Kirk!*
A typical specimen of Perrottet's in the British Museum shows that his *Bastardia angulata* is referable to the same species as that subsequently called *A. intermedium* by Hochstetter.

2. **A. asiaticum,** *Don, Gen. Syst.* i. 503. An erect perennial whose branches are covered with down, mingled with a few villi. Leaves stalked, cordate-ovate, acute, crenate-dentate, 7–12-nerved, downy on both surfaces, stalks scarcely so long as the blades. Stipules leafy, subulate. Peduncles axillary, solitary, 1-flowered, longer than the leaves, jointed near the top. Calyx-segments deltoid, acuminate, as long or longer than the ripe fruit. Petals reddish-yellow (*Vogel*). Fruit subglobose, depressed in the centre, an inch or more in diameter, of 20 or more carpels, which ultimately fall away from the axis, and are reniform, 2-mucronate, downy, and 3-seeded.—*Sida asiatica*, Linn.; DC. Prod. i. 470. *S. guineensis*, Schum. et Thonn. Pl. Guin. 307.

Upper Guinea. Niger, *T. Vogel!*
Mozamb. Distr. Senna, *Dr. Kirk!* Mozambique, *Forbes!* Quilimane and elsewhere, *Peters.*
A widely distributed plant in the tropics; closely allied to *A. indicum*, but differing from it in the greater relative length of the peduncles and of the calyx.

3. **A. graveolens,** *Wight et Arnott, Prod. Fl. Ind.* i. 56. A tall perennial covered with down, interspersed among which are a few spreading villi. Leafstalks as long as the leaves, the latter orbicular-cordate, acuminate, coarsely dentate, 7–12-nerved. Pedicels solitary, axillary, jointed, shorter than the leafstalks. Calyx cup-shaped, 5-fid, its 5 segments oval, cuspidate, shorter than the yellow corolla, but about equalling the ripe fruit which latter is subglobose and consists of 20 carpels ultimately seceding from the axis. Carpels membranous, oblong, somewhat rounded at the apex, shortly beaked or muticous. Seeds reniform, 3 in each carpel.—*Sida graveolens*, DC. Prod. i. 473. *Abutilon tortuosum*, Guill. et Perr. Fl. Seneg. i. 68. *A. Figarianum*, Webb, Frag. Fl. Æthiop. 53.

Upper Guinea. Senegambia, *Perrottet!*
Nile Land. Nubia, *Kotschy! Schweinfurth!* Abyssinia, *Schimper!*
Mozamb. Distr., *Peters!*
A common Indian plant, occurring also in Queensland.

4. **A. longicuspe,** *Hochst. in Rich. Fl. Abyss.* i. 68. A shrubby, much-branched plant, thickly beset with fine down. Leaves stalked, cordate, broadly ovate, with long points, serrate, palmately 5–7-nerved, paler beneath. Flowers numerous, in large, terminal, much-branched, ultimately leafless clusters. Pedicels jointed. Calyx broadly cup shaped, 5-cleft; segments acute, about one-third the length of the purplish reflected corolla. Fruit subglobose, umbilicate, downy, longer than the persistent calyx. Car-

pels about 20, obtuse, reniform, 1-seeded, ultimately seceding from the axis. —*Sida longicuspis*, Hochst. Pl. Schimp. Abyss. *S. acuminata*, R. Br. in Salt, Abyss. App. 65.

Nile Land. Abyssinia, *Salt! Schimper!*
Mozamb. Distr. Mount Chiradzura, *Dr. Meller!*

5. **A. glaucum,** *Webb in Hook. Fl. Nigrit.* 109. A tall perennial or undershrub with cylindrical, downy branches. Leafstalks about as long as the leaves, which latter are roundish or slightly angular, cordate, acuminate, irregularly dentate, 7–9-nerved, downy on both surfaces. Panicles axillary and terminal. Floral leaves deciduous. Peduncles jointed, scarcely as long as the petioles. Calyx cup-shaped, its 5 segments ovate, cuspidate, sometimes deltoid and acuminate, shorter than the corolla. Petals pinkish with a deeper coloured spot at the base. Fruit subglobose, depressed at the top, very downy, exceeding the persistent calyx. Carpels 20 or more, ultimately seceding, membranous, reniform, beakless, each 2–3-seeded.—*A. asiaticum*, Guill. et Perr. Fl. Seneg. i. 67, non Linn. *Sida glauca*, Cav. Ic. i. 8. t. 11. *S. mutica*, Delile, Ill. Fl. Egypte, 60, n. 45. *S. pannosa*, R. Br. in Salt, Abyss. App. 65, an Forst.? *Abutilon muticum*, Webb, Frag. Fl. Æthiop. 51. *A. pannosum*, Webb, l. c.

Upper Guinea. Senegambia, *Heudelot! Brunner!*
Nile Land, *Speke and Grant!* Sennar, *Kotschy!* Nubia, Soturba, *Schweinfurth!* Abyssinia, *Salt! Petit!*

A widely distributed plant, occurring in Egypt, the Cape de Verde Islands, Affghanistan, and the hotter parts of Asia.

Webb, in the 'Niger Flora,' showed that the *Abutilon asiaticum* of Guillemin and Perrottet was referable to the same species as the *Sida mutica* of Delile, both names however being superseded by the prior one of Cavanilles, *S. glauca*, hence Webb's name of *A. glaucum*. Subsequently, in the 'Fragmentum Florulæ Æthiopiæ,' Webb considered that the Senegal plant belonged to *Abutilon* or rather to *Sida pannosa*, Forst. Where Forster published this species is not known to me. R. Brown, however, as shown by a ms. note to one of Salt's specimens in the British Museum, was of the same opinion. Webb, further, in the last-named publication seeks to distinguish *A. muticum* from *A. pannosum*, on the ground of certain slight differences in the form of the stipules, sepals, colour of flowers, etc.; but none of these differences (unless it be the colour of corolla) are constant even on the same specimen. Hence it has not been thought advisable to adhere to Webb's latest views, but to those expressed in the 'Niger Flora.'

6. **A. macropodum,** *Guill. et Perr. Fl. Seneg.* i. 69. *t.* 14. A low-growing, much-branched, suffrutescent perennial, the younger shoots and leaves downy. Petioles 1–2 in. long, equalling the leaves, which are cordate, roundish, obscurely 3-lobed; lobes broad entire or crenate. Stipules linear. Pedicels nearly as long as the leaves, simple, solitary, axillary, 1-flowered, thickened at the apex, jointed. Sepals ovate, acute, slightly cuspidate, downy, much shorter than the ripe fruit, which is cylindrical, truncate, scarcely an inch long, about an inch across, and consisting of 20 or more membranous, readily-separable carpels, each terminated by two awns, which are at first erect and ultimately spread horizontally. Seeds large; columella thick cylindrical or clavate, longer than the calyx.

Upper Guinea. Senegambia, *Perrottet!*

Apparently a well-marked species as to its habit and the great comparative size of the ripe carpels.

7. **A. zanzibaricum,** *Bojer, mss.?* An undershrub or tall perennial with downy branches. Leafstalks as long or longer than the blades, which are cordate, ovate, acuminate, wavy at the margins, downy on both surfaces, paler beneath, 7–9-nerved. Flowers yellow, in terminal leafy panicles. Peduncles erect or spreading, as long as the petioles, jointed. Calyx-segments lanceolate, downy. Ripe fruit flat at the top, umbilicate, 1–1½ in. diam., twice the length of the persistent calyx. Carpels 20, spreading, ultimately separating from the columella, oblong, very acute, blackish, membranous, terminating in two teeth.

Upper Guinea. Niger, *Barter!*
Lower Guinea. Congo, *Burton!*
Mozamb. Distr. Senna, Zambesi, *Kirk!* Zanzibar, *Bouton!*

8. **A. ramosum,** *Guill. et Perr. Fl. Seneg.* i. 68. An erect branching perennial clothed with dense tomentum, intermixed with long spreading hairs. Leaves on long stalks, broadly ovate-cordate, acuminate, sometimes 3-cuspidate, slightly hairy on both surfaces, crenate-serrate, palmately 5–7-nerved. Stipules linear. Peduncles axillary and terminal, shorter than the petioles, slender, cylindrical, trichotomous; pedicels jointed. Calyx cup-shaped, 5-cleft; segments acute, half the length of the white (or yellow?) roundish petals. Ripe fruit longer than the calyx. Carpels 8–10, each terminating in two long villose spreading or reflexed awns, and splitting through the dorsal suture. Seeds 2–3 in each carpel.—*Sida ramosa,* Cav. Diss. i. 28. t. 6. f. 1. *Abutilon sparmannioides,* Guill. et Perr. Fl. Seneg. i. 70. *A. elæocarpoides,* Webb, Frag. Fl. Æthiop. 52.

Upper Guinea. Senegambia, *Brunner! Perrottet!*
Nile Land. Abyssinia, *Schimper!* Kordofan, Sennar, *Kotschy!*
This species occurs in Bombay and N.W. India. The Mexican *A. Thurberi,* A. Gray, approximates very closely to it.

9. **A. indicum,** *Don, Gen. Syst.* i. 504. A downy perennial with leafstalks generally shorter than the leaves, the latter cordate-ovate, acuminate, irregularly crenate-dentate, 7–9-nerved, downy on both surfaces. Flower-stalks solitary axillary or aggregated towards the ends of the branches, simple or slightly branched, longer than the leafstalks, jointed above the middle. Calyx cup-shaped, its 5 segments ovate, cuspidate, shorter than the yellow petals. Ripe fruit cylindrical or narrowed below the top, truncate, of numerous seceding carpels, each of which is oblong, acute and terminated by 2 points, 1 directed inwards and downwards, the other outwards and upwards. Seeds 3 in each carpel.—*Sida indica,* DC. Prod. i. 471. *S. grandiflora,* Don, Gen. Syst. i. 504.

Upper Guinea. St. Thomas, *Don!* Niger, *Barter!* Abbeokuta, *Irving!*
Nile Land, *Speke and Grant!* Abyssinia, *Schimper!*
Mozamb. Distr. Seshike, *Dr. Kirk!* Manganya hills, *Dr. Meller!* Shamo, *Dr. Kirk!*
Widely distributed throughout the tropics and variable in stature, hairiness, length of carpellary teeth, etc.

10. **A. bidentatum,** *Hochst. in Rich. Fl. Abyss.* i. 68. An erect undershrub with slender downy branches. Leaves on short stalks, cordate-

ovate, acute, scarcely acuminate, minutely toothed, slightly pilose and villose on both surfaces. Flowers in small axillary panicles. Peduncles longer than the petioles, jointed above. Calyx 5-fid; segments deltoid, acuminate, shorter than the ripe fruit, which latter is subglobose, truncate, depressed. Carpels 16–20, 3-seeded, compressed, truncate at the apex and 2-dentate, one tooth directed outwards, the other towards the centre of the flower.

Nile Land. Abyssinia, *Schimper!* Soturba, *Schweinfurth!* Kordofan, Sennar, *fide Webb.*

Found also in Arabia.

11. **A. hirtum,** *Don, Gen. Syst.* i. 503. A tall, erect, perennial plant, whose branches are covered with down, interspersed among which are a few brownish spreading villi. Leaves on long stalks, ovate-cordate, acute, subacuminate, coarsely serrate, 6–7-nerved, downy on both surfaces. Stipules persistent, subulate. Peduncles simple or branched, axillary or terminal, about the length of the leafstalk, articulate near the top. Calyx subglobose, 5-fid, its segments oval, cuspidate, equalling the ripe carpels. Petals large, bright orange, hairy at the base. Fruit truncate, depressed. Carpels 12 or more, oblong, truncate above and terminating in 2 short teeth, 1 looking outwards the other towards the centre of the flower. Seeds 3 in each carpel. —*Sida hirta,* Lam. Dict. i. 7. *Abutilon heterotrichum,* Hochst. Pl. Schimp. Abyss. *A. Kotschyi,* Hochst. in Webb, Frag. Fl. Æthiop. 52.

Nile Land. Abyssinia, *Schimper! Plowden!* Kordofan, *Kotschy!* White Nile, *v. Harnier!*

Mozamb. Distr. Zambesi, Senna, Tette, *Peters.*

The same species occurs on the coast of Venezuela, where a specimen was collected by Buschell, and which is now deposited in the Hookerian herbarium.

12. **A. auritum,** *Mast.* A perennial, covered for the most part with fine down, intermingled with which are a few villi. Leaves on very long hispid stalks, orbicular, cordate, acuminate, dentate, downy on both surfaces, villous or hispid along the nerves. Stipules large, oblique, broadly ovate-lanceolate. Inflorescence a terminal, ultimately leafless, panicle; pedicels short, jointed below the middle. Calyx hispid, deeply 5-parted; segments ovate-lanceolate. Ripe fruit cylindrical, truncate, umbilicate, longer than the persistent calyx. Carpels 20, not seceding, oblong, subrostrate, blackish, membranous, dehiscing along the dorsal suture, each 3-seeded. Seeds covered with tufts of stellate hairs.—*Sida aurita,* Wall. Cat. n. 1860!

Upper Guinea. Wellington, Sierra Leone, *Dr. Kirk!* This is identical with Wallich's plant above cited.

13. **A. fruticosum,** *Guill. et Perr. Fl. Seneg.* i. 73. A much branched rigid perennial or undershrub, densely covered with fine white down. Leaves small, on short stalks, cordate-ovate, acute, denticulate, covered with soft whitish down on both surfaces; stipules linear. Peduncles solitary, axillary, longer than the petiole, 1–3-flowered, jointed. Calyx half the length of the corolla; calyx-lobes ovate, acute. Fruit cylindrical, truncate, about ½ in. long, scarcely shorter than the calyx. Carpels 10, persistent, each one oblong, truncate, with no beak, splitting down the back. Seeds 2 3 in each carpel, tuberculate.—*A. microphyllum,* Rich. Fl. Abyss. i. 70. t. xv. *A. den-*

ticulatum, Fres. Mus. Senk. i. 182. *A. albidum*, Webb et Berthelot, Canar. iii. 39. t. 2. *Sida Kotschyi*, Hochst. mss. *S. gracilis*, R. Br. in Salt, Abyss. App. 65.

Nile Land. Sennar, *Kotschy!* Kordofan, *Kotschy!* Nubia, Soturba, *Schweinfurth!* Abyssinia, *Salt!*

The plant varies in the size of its leaves. It occurs in Upper Egypt, the Canaries, as well as in Arabia, Aden, Palestine, and Scinde.

From a manuscript note attached to Salt's Abyssinian specimens, in the British Museum, it appears that the flowers of this species expand in the daytime only, most Abutilons being evening flowerers. It is curious that the same thing has been noticed by Stocks in Scinde, who says of the present species, "Unlike the other Abutilons, this one expands its flowers in the middle of the day, like the Sidas."

6. **MALACHRA,** Linn.; Benth. et Hook. f. Gen. Pl. i. 205.

Bractlets numerous, arranged with the flowers in dense heads; the outer ones large, foliaceous; the inner ones linear, crowded, but not forming a distinct epicalyx to each flower. Calyx 5-parted. Column short, truncate or 5-toothed. Ovary 5-celled. Styles 10. Stigmas capitate. Ripe carpels separating from the axis, obovoid, indehiscent or slightly dehiscent at the upper and inner edge. Seeds reniform, one in each carpel. Radicle inferior. —Hispid herbs, with angular or lobed leaves; flowers yellowish white or purplish, in dense axillary or terminal clusters.

The species are widely distributed throughout the tropics of both hemispheres.

Leaves roundish, slightly 3–7-lobed; lobes broad, at least at the base . 1. *M. capitata.*
Leaves deeply 3–7-parted; lobes narrow . . . . . 2. *M. radiata.*

1. **M. capitata,** *Linn.; DC. Prod.* i. 440. An erect, coarsely hairy perennial, with roundish stalked leaves. Flowers in axillary and terminal heads, shortly stalked. Bracts 3 or 4, roundish, acute, with a white spot at the base. Calyx 5-parted, its lobes subulate. Petals yellow or white, 2 or 3 times longer than the calyx. Fruit subglobose or turbinate, depressed, of 5 slightly rough carpels.—*M. hispida*, Guill. et Perr. Fl. Seneg. i. 47.

Upper Guinea. Senegambia, *Perrottet!*
Lower Guinea. Congo, *Smith!*
A common West Indian plant.

2. **M. radiata,** *Linn.; DC. Prod.* i. 440. An erect perennial or undershrub, coarsely hairy with spreading hairs. Leaves on short stalks, palmately 5–7-sect; segments oblong, lanceolate, crenate, serrulate, pilose. Stipules linear. Flowers numerous, in terminal, subglobose heads, 1–2 in. diam. Bracts of the involucre 5 or more, very shortly stalked, suborbicular, obtuse or provided with a long tail-like point. Bractlets very numerous, linear, as long as or longer than the urceolate 5-cleft calyx, whose segments are deltoid and densely hispid. Corolla reddish, twice the length of the calyx. Fruit turbinate, depressed in the centre. Carpels 5, oblong, obtuse, thin, submembranous, reticulate, half the length of the calyx.

Upper Guinea. Niger, *Barter!*
Lower Guinea. Congo, *Smith!*
Occurs also in Mexico, the West Indies, Brazil, and other parts of S. America.

7. **URENA,** Linn.; Benth. et Hook. f. Gen. Pl. i. 205.

Bractlets 5, adnate to the calyx. Calyx 5-cleft. Staminal column truncate at the apex or 5-toothed; anthers numerous, nearly sessile. Ovary 5-celled, with a single ovule in each cell. Styles 10. Stigmas capitate. Ripe carpels indehiscent, separating from the axis, covered with hooked bristles. Seeds ascending.—Rigid herbs or undershrubs. Leaves angled or lobed. Flowers sessile or on very short stalks, often clustered. Flowers yellow.

Only differs from *Pavonia* in the hooked carpels. The species are widely distributed throughout the tropics of both hemispheres.

1. **U. lobata,** *Linn.; DC. Prod.* i. 441. An erect stiff shrub or herb, more or less pilose in all parts, and often provided with stellate tomentum. Leaves exceedingly variable in size and form; stalk shorter than the blade, which latter is sometimes linear oblong or oblanceolate, coarsely toothed, with hardly an indication of lobes, at other times suborbicular, subcordate or wedge-shaped at the base, more or less deeply 3–5-lobed, slightly scabrous above tomentose below and palmately 3–5- or 7-nerved; nerves prominent on the under surface and provided with 1–3 glands near the base. Flowers solitary or geminate, on short, axillary, articulate stalks. Epicalyx of 5 oblong-lanceolate, erect segments as long as the ripe fruit. Corolla pink, three times the length of the calyx. Fruit subglobose, depressed at the top, of 5 obtuse, three-sided, indehiscent carpels.—*U. americana*, Linn. R. Br. in Tuck. Congo App. 484. *U. diversifolia*, Schum. et Thonn. Pl. Guin. 308. *U. virgata*, Guill. et Perr. Fl. Seneg. i. 48. *U. obtusata*, Guill. et Perr. Fl. Seneg. i. 48. *U. tricuspis*, Cav. Diss. vi. 334. *U. sinuata*, Linn.; DC. Prod. i. 442.

Upper Guinea. Senegambia, *Perrottet!* Gambia, *Park! Whitfield! Heudelot!* Niger, *T. Vogel! Barter! Milne!* Fernando Po, *Barter!*
Nile Land, *Speke and Grant!* Sennar, *Duke of Würtemberg;* White Nile, *v. Harnier.*
Mozamb. Distr., *Forbes! Dr. Kirk!*
This species is widely spread throughout the tropics and subtropical regions of both hemispheres, and occurs also in Queensland. It is exceedingly variable in the shape of the leaves, the proportions of the several parts of the flower, and the size of the hooks on the carpels. *U. sinuata* is generally considered as a distinct species, having more deeply divided leaves, with 3 glands on the under surface, but it becomes evident that no reliance can be placed on these characters when a suite of specimens, from many localities, is examined. A deeply-lobed form is cultivated, according to Barter, in the Niger districts, for the sake of its fibre.

8. **PAVONIA,** Cav.; Benth. et Hook. f. Gen. Pl. i. 205.

Bractlets of the epicalyx 5–∞, distinct or connate. Calyx 5-cleft or toothed. Column truncate or 5-toothed at the apex; filaments numerous. Ovary 5-celled. Styles 10. Stigmas capitate. Ripe carpels separating from the axis, rounded or truncate at the upper end, aristate or muricate (not glochidiate), sometimes winged, indehiscent or rarely slightly 2-valved. Radicle inferior.—Herbs or shrubs, covered with down or hair or smooth. Leaves angular or lobed. Flowers stalked, axillary or clustered. Petals spreading or convolute.

A rather large genus, whose species are met with in the tropics of both hemispheres, the islands of the Pacific, and even in Australia.

Epicalyx of 5–6 segments. (Sect. *Lebretonia.*)
- Carpels muricate . . . . . 1. *P. procumbens.*
- Carpels smooth.
  - Segments of the epicalyx broad, exceeding the calyx . . . 2. *P. macrophylla.*
  - Segments of the epicalyx narrow, shorter than the calyx . . 3. *P. Meyeri.*

Epicalyx of 6–12 segments.
- Carpels prickly or awned.
  - Prickles softish, reflexed . . . . . 4. *P. hirsuta.*
  - Carpels with 2 stout awns . . . . . 5. *P. propinqua.*
  - Carpels with 3 awns . . . . . 6. *P. Schimperiana.*
- Carpels smooth, neither prickly nor awned.
  - Carpels winged.
    - Carpellary wings narrow . . . . . 7. *P. zeylanica.*
    - Carpellary wings broad.
      - Bractlets 10–12, slightly exceeding the calyx . . . . 8. *P. Kotschyi.*
      - Bractlets 15–20, very long . . . . . 9. *P. clathrata.*
  - Carpels entirely without wings.
    - Leaves entire or nearly so . . . . . 10. *P. arabica.*
    - Leaves palmately divided, downy beneath . . . . . 11. *P. odorata.*

1. **P. glechomæfolia,** *Rich. Fl. Abyss.* i. 54. A rigid procumbent plant, with slender hirsute branches. Leafstalks as long as the blades, which are cordate-roundish, somewhat 3-lobed, the central lobe longest, crenate-serrate, hairy on both surfaces. Stipules linear. Peduncles slender, axillary, 1-flowered, as long as or longer than the petioles, jointed near the top. Epicalyx of 5–6, spreading, oval or lanceolate; segments exceeding the calyx. Corolla yellow, longer than the epicalyx. Carpels 5, oblong, obtuse, somewhat woody, muricate, sometimes having a dorsal, serrulated crest.—*Urena glabra,* R. Br. in Salt, Abyss. App. 65. *Lebretonia procumbens,* Wight and Arn. Prod. Fl. Ind. i. 47. *Lebretonia cordata,* Hochst. Pl. Schimp. Abyss.

Nile Land. Abyssinia, *Salt! Schimper!* Kordofan, *Cienkowski.*
Mozamb. Distr. Lupata, Zambesi, *Dr. Kirk!* Senna, *Peters.*
The form and size of the leaves and the spiny tubercles are subject to much variation. In Abyssinia the plant is said to close its flowers after noon.
The species occurs in India, Ceylon, Arabia, etc.

2. **P. macrophylla,** *E. Mey.; Harv. and Sond. Fl. Cap.* i. 169. A tall, erect, pilose, branched herb or undershrub. Leaves on long stalks, oval, cordate acuminate, sometimes somewhat 3-lobed, coarsely and irregularly crenate-serrate, pubescent; nerves prominent below and ciliolate. Peduncles slender, axillary, 1-flowered, as long as or longer than petiole, jointed above. Epicalyx of 5 or rarely 7, foliaceous, elliptic, acute segments, exceeding the sepals in length. Petals pink, three times the length of the calyx. Carpels 5, obovate, with prominent reticulated nerves. Styles 8–10. Seed solitary in each carpel, reniform, smooth, ascending.—*Urena mollis,* R. Br. in Salt, Abyss. App. 65; Hochst. Pl. Schimp. Abyss. *P. (Lebretonia) crenata,* Hochst. Pl. Schimp. Abyss. *Lebretonia acuminata,* Rich. Fl. Abyss. i. 53. t. 13.

Nile Land. Abyssinia, *Salt! Pearce! Schimper! Plowden! Roth!* White Nile, *v. Harnier;* Uganda, *Speke and Grant!*
South Central. Lake Ngami, *M'Cabe!*

This plant occurs also at Natal, the Cape of Good Hope, Bourbon, etc.

3. **P. Meyeri,** *Mast.* A much-branched, downy, herbaceous plant. Leaves on long stalks, roundish-subcordate, sub-3-cuspidate or even more deeply divided, crenate-dentate, downy on both surfaces, 5–7-nerved. Peduncles solitary, axillary, remote or crowded at the ends of the branches, shorter than the petioles, not jointed. Epicalyx of 5–6 ligulate bracts, shorter than the cup-shaped 5-parted calyx, whose lance-shaped segments are traversed by three prominent green nerves. Corolla pink. Fruit of 5 coherent, oblong, obtuse, 3-sided, woody carpels.—*P. mollis*, E. Mey.; Harv. and Sond. Fl. Cap. i. 169; nec H. B. K. Nov. Gen. v. 283.

Mozamb. Distr. Manganya hills, *Dr. Meller!*
Frequent in some parts of the Cape, also found in Natal.

4. **P. hirsuta,** *Guill. et Perr. Fl. Seneg.* i. 51. An erect or ascending, much-branched, downy or villose perennial or undershrub. Petioles of varying length, sometimes very short, at other times as long as or longer than the blades. Leaves subcoriaceous, scabrous above, downy below, cordate, suborbicular obtuse or acute, sometimes obscurely 3-lobed, coarsely and irregularly toothed. Stipules linear, deciduous. Flowers on solitary stalks, in the axils of the upper leaves, crowded so as to resemble a leafy panicle. Epicalyx of 12 linear villose segments, united at the base. Calyx campanulate, as long as or longer than the epicalyx, 5-parted; lobes ovate-lanceolate, traversed by 3–5 greenish, longitudinal striæ. Corolla yellow, with a purple centre, 2–3 in. across, much exceeding the calyx. Styles 10. Carpels 5, shorter than the calyx, oblong, obtuse or with an inflexed point, woody, rugose, covered with reflexed bristles, seceding one from another when ripe.—Walp. Rep. i. 297. *P. insignis*, Fenzl in Plant. Kotschy and in Webb, Frag. Fl. Æthiop. 42.

Upper Guinea. Senegambia, *Perrottet! Heudelot!*
North Central. Kouka, *E. Vogel!*
Nile Land, *Kotschy! Speke and Grant!* White Nile, *Petherick!* Kordofan, *Cienkowski!*
The plant seems to be subject to slight variation in habit, but not sufficiently to warrant specific distinction, as many intermediate forms may be found. The carpels are more or less covered with mucilaginous exudation.

5. **P. propinqua,** *Garcke in Schweinf. Fl. Æthiop.* i. 55. A small undershrub, with an erect woody stem, dividing into numerous elongate cylindrical branches, the younger ones sparingly clothed with stellate hairs. Leaves stalked, 1–4 in. long, oblong, obtuse, subcordate at the base, unequally crenate-dentate, scantily covered with stellate hairs; stalks for the most part shorter than the blade. Stipules linear, subulate. Peduncles solitary, axillary, remote or clustered and subcapitate at the ends of the branches, 1-flowered, jointed. Epicalyx of 10 linear-lanceolate ciliolate bracts, half as long again as the sepals. Calyx cup-shaped, 5-cleft; lobes ovate-lanceolate. Corolla yellow, more than an inch across, exceeding the epicalyx in length. Fruit subglobose, depressed, of 5 coherent, oblong, 3-sided woody carpels; back convex, sides flat, provided at the upper angles with two short prickles. —*P. grewioides*, Hochst. in Pl. Schimp. Abyss.

Nile Land. Abyssinia, *Schimper!*
Some of the specimens have a curious fleshy process at the base of the carpels.

6. **P. Schimperiana,** *Hochst. in Rich. Fl. Abyss.* i. 52. A villose or tomentose, erect perennial or undershrub, 3–4 ft. high. Stalks of the lower leaves as long as the blades; upper ones shorter; leaf-blades cordate, palmately 5–7-lobed; lobes lanceolate, acuminate, coarsely serrate, smooth or very downy. Peduncles shorter than the petioles, aggregated in the axils of the leaves. Epicalyx of 10–12 linear ciliolate segments. Calyx bell-shaped, 5-cleft; segments lanceolate, 3-nerved, shorter than the epicalyx. Carpels 5, 1-seeded, indehiscent, somewhat woody, obtuse, 3-gonous, with 3 long erect awns, clothed with reflexed hairs and projecting beyond the calyx.—Walp. Ann. ii. 140. *P. tomentosa*, Hochst. Pl. Schimp. Abyss.

Nile Land. Abyssinia, *Salt! Pearce! Schimper! Roth! Parkyns!* Karague hills, *Speke and Grant!*
Mozamb. Distr. Chiradzura mountains, *Dr. Meller!*
The plant varies considerably in the proportional size of its leaves, in the more or less dense covering of hairs, and in the remoteness or approximation of its flowers. Specimens gathered on the hills are much more downy than those collected on lower ground. Garcke inclines to the opinion that the two forms here united (as also by Richard) are distinct. He also considers the tomentose form to be identical with *P. urens*, of Cavanilles, a point not readily determined without seeing authentic specimens.

7. **P. zeylanica,** *Cav.; DC. Prod.* i. 444. A much-branched, hispid perennial, 2–3 feet high, with a thick woody stock, dividing at its apex into numerous elongated, decumbent branches. Leaves on long stalks, cordate, roundish, deeply 3–5-lobed; the central lobes longest, dentate. Stipules subulate. Peduncles solitary, axillary, as long or longer than the petioles, jointed near the top. Epicalyx of 10 linear, ciliolate bracts, longer than the cup-shaped calyx. Sepals lanceolate. Corolla exceeding the epicalyx, pink or yellow (?). Carpels 5, oblong, obtuse, 3-sided; back flat with convex sides and a rudimentary marginal wing. Seeds slightly hairy.—*Hibiscus senegalensis*, Cav. Diss. t. 68. f. 1. *Pavonia triloba*, Guill. et Perr. Fl. Seneg. i. 50.

Upper Guinea. Senegambia, *Perrottet! Heudelot!*
Nile Land. Abyssinia, *Schimper!* Kordofan, *Cienkowski.*
The species occurs in India, Ceylon, the Mauritius, etc. It varies greatly in the form and lobation of the leaves.

8. **P. Kotschyi,** *Hochst. in Webb, Frag. Fl. Æthiop.* 43. A low growing woody perennial, dividing at the summit of the stock into a number of closely set, erect or spreading branches, densely villose. Leaves stalked, oblong-ovate, obtuse, coarsely serrate, 3–5-nerved. Stipules linear. Peduncles solitary, axillary, 1-flowered, as long or longer than the leaves, jointed at the summit. Epicalyx of 10 linear, ciliolate bracts, exceeding the cup-shaped 5-parted calyx, whose segments are lance-shaped, villose. Corolla yellow, scarcely an inch across, as long or longer than the epicalyx. Fruit of 5, 1-seeded, oblong, subfoliaceous carpels, each provided with two large wings.

North Central. Kouka, *E. Vogel!*
Nile Land. Sennar, *Kotschy!* Kordofan, *Cienkowski;* Abyssinia, *Schimper!*
Also found in Arabia.

9. **P. clathrata,** *Mast.* A perennial or undershrub, whose branches are densely covered with long shaggy hairs. Leaves on long stalks, roundish, cordate, deeply palmately 5–7-lobed; lobes oblong, obtuse or acute, sinuous or serrulate. Stipules setaceous. Peduncles solitary, axillary, 1-flowered, jointed near the top, as long as or longer than the leafstalk. Epicalyx of 15–20 long, ciliolate, distinct bractlets. Calyx much shorter than the epicalyx, bell-shaped, 5-parted; segments lanceolate, hairy. Corolla pink, scarcely longer than the bractlets. Carpels 6, ovate, pointed, winged at the edges, shorter than the calyx and concealed by the overarching epicalyx. Seeds numerous, glabrous except at the hilum.

South Central. North Shaw Valley, *Baines!*

The very long erect bracts, which ultimately arch over the capsule and resemble a bird-cage, furnish good marks whereby to distinguish this species.

10. **P. arabica,** *Hochst. Pl. Schimp. Abyss.* An erect, tufted, tomentose perennial or undershrub, with few spreading branches. Leafstalks as long as the blades, which are oblong, subcordate, obtuse or subtruncate, entire or with small dentations at the apex. Stipules linear. Peduncles solitary, axillary, as long as or longer than the leafstalk. Epicalyx of 10 20 linear villose bracts arching over the ripe fruit. Calyx cup-shaped, shorter than the bracts, its 5 segments lanceolate. Corolla pink, longer than the calyx. Fruit subglobose, about the size of a pea, of 5 somewhat woody, oblong-obtuse, 3-sided, villose carpels, shorter than the epicalyx.

Nile Land. Abyssinia, *Schimper! Ehrenberg!*

Occurs also in Scinde and Arabia.

The Indian specimens have sometimes lobed leaves, when they greatly resemble some of the forms of *P. zeylanica.* The Abyssinian plant is so distinct in appearance that it is here kept distinct, but probably it will ultimately merge into *P. zeylanica.*

11. **P. odorata,** *Willd.; DC. Prod.* i. 444. An erect herbaceous plant, covered with sticky hairs. Leafstalks as long as or longer than the blades, which latter are cordate ovate, obscurely lobed, somewhat 3-cuspidate, dentate, palmately 3–5-nerved, densely hairy beneath. Peduncles solitary, axillary or clustered at the ends of the branches, as long as the leaves, 1-flowered. Epicalyx of 10–12 linear ciliolate segments, longer than the sepals. Calyx-lobes 5, lanceolate. Corolla pink, twice the length of the calyx. Fruit of 5 obovate, unarmed carpels.

Nile Land. Abyssinia, *Ehrenberg!*

Mozamb. Distr. Querimba, *Peters!*

A common Indian plant, probably occurring in other parts of Africa than those above mentioned.

9. **KOSTELETZKYA,** Presl; Benth. et Hook. f. Gen. Pl. i. 206.

Bractlets 7–10, very small or obsolete. Calyx 5-cleft or 5-toothed. Staminal column entire or 5-toothed. Ovary 5-celled, with 1 ovule in each cell. Styles 5. Stigmas capitate. Capsule oblong, depressed, dehiscing loculicidally along the 5 projecting angles. Seeds reniform, flat, ascending.—Herbs or shrubs, with hispid leaves. Flowers purple or yellow.—*Hibisci,* sect. *Pentaspermum,* DC.

1. **K. adoensis,** *Hochst. ex Walp. Ann.* ii. 143. A large herb or undershrub, with erect, rod-like branches, traversed by a line of hairs along one side, and which shifts at every joint to the opposite side. Leaves on long stalks, roundish, cordate, acuminate, 3-nerved, sometimes 3-cuspidate, coarsely serrate, slightly hairy. Stipules linear, ciliolate. Peduncles very slender, branched, scarcely so long as the petioles. Bractlets 7–10, linear-lanceolate, hairy. Calyx longer than the epicalyx, 5-lobed, its lobes oval-lanceolate, ciliate. Corolla yellow with a purple centre, twice the size of the calyx. Capsule hispid, depressed, pentagonal, deeply furrowed, dehiscing at the salient angles, 5-celled, 5-seeded. Seeds flat.—*Hibiscus terniflorus,* Garcke in Bot. Zeit. vii. 833.

Nile Land. Sennar, *Heughlin;* Abyssinia, *Salt! Pearce! Schimper! Dillon and Petit!*

Mozamb. Distr. Island of Zanzibar, *Bouton!*

Garcke, in Schweinfurth's 'Beiträge,' mentions, under the var. *hispidissima,* a form of this species covered with long spreading hairs, which I have not seen.

10. SENRA, Cav.; Benth. et Hook. f. Gen. Pl. i. 207.

Bractlets 3, large, cordate, ultimately membranous. Calyx short, 5-toothed. Ovary 5-celled with 2 ovules in each cell. Styles 5, dilated above, obliquely truncated at the top. Capsule loculicidal. Seeds solitary in each cell by abortion, reniform, ascending, pubescent or villose.—An undershrub covered with fine down. Flowers yellow or purple.—*Serræa* (errore), Cav. l. c. *Dumreichera,* Steud. and Hochst. in Pl. Schimp. Abyss.

1. **S. incana,** *Cav. Diss.* ii. 83. *t.* 35. *f.* 3; *DC. Prod.* i. 457. A much-branched undershrub, its herbaceous portions covered with soft down. Leaves on long stalks, roundish, cordate, palmately 3–5-lobed, denticulate. Stipules fugitive, setaceous, tomentose. Peduncles solitary, axillary, continuous, not jointed, sometimes crowded in long, terminal or axillary, erect, leafy racemes. Epicalyx of 3 oval, cordate, membranous, palminerved leaflets. Calyx bell-shaped, 5-fid, its segments equal, lanceolate-acute, submembranous. Petals wedge-shaped, obovate, oblique, violet below, yellow above, or all violet, shorter than the involucre, but double the size of the calyx. Style 5-fid. Ovary 5-furrowed, 5-celled, with 2 ovules attached to the inner angle of each cell. Capsule ovoid, roundish, reticulate, membranous, loculicidally 5-valved, the valves opposite to the calyx-lobes, their margins slightly winged. Seeds solitary by abortion, spotted with black dots and pilose.—Decaisne in Ann. Sc. Nat. Ser. 2. t. iv. 70. t. 4. *S. arabica,* Webb, Frag. Fl. Æthiop. 48. *S. nubica,* Webb, l. c.

Nile Land. Kordofan, *Kotschy!* Abyssinia, *Ehrenberg;* Sennar, *Duke of Würtemberg.*

This singular plant is also a native of Arabia and Scinde. The variations in the size of the calyx and bractlets are too inconstant to be considered of specific importance.

11. HIBISCUS, Medik; Benth. et Hook. f. Gen. Pl. i. 207.

Epicalyx of 5 or more distinct or more or less connate bractlets. Calyx 5-lobed or toothed. Staminal column truncate or 5-toothed at the summit. Ovary 5-celled with 3 or more ovules in each cell. Style simple below, divid-

ing above into 5 branches, each terminated by a capitate stigma. Capsule coriaceous, loculicidally 5-valved, sometimes (§ *Paritium*) with false dissepiments. Seeds reniform, angular or subglobose, glabrous downy or woolly. —Herbs shrubs or small trees, generally more or less downy or hairy, sometimes glabrous. Leaves polymorphous, generally palmately divided. Stipules usually small and deciduous. Flowers generally large and showy, often with a dark purple centre, and in many species changing colour at different times of the day.

A genus rich in species, which are, for the most part, widely distributed through the tropics, a few extending into more temperate regions, such as Japan, China, the south of Europe, etc.

Calyx persistent.
- Bractlets of the epicalyx distinct, entire. Seeds smooth, pubescent or tubercled, not cottony.
  - Calyx ventricose . . . . . 1. *H. Trionum.*
  - Calyx not ventricose.
    - Capsule obtuse or depressed at the apex.
      - Capsule winged.
        - Bracts oblong, spathulate, as long as the calyx . . 2. *H. dictyocarpus.*
        - Bracts linear, filiform, shorter than the calyx . . . 3. *H. vitifolius.*
      - Capsule not winged . . . . . 4. *H. lepidospermus.*
    - Capsule pointed.
      - Annual.
        - Calyx segments 1-nerved . . . . . 5. *H. obtusilobus.*
        - Calyx segments 3-nerved; nerves green . . . . 6. *H. intermedius.*
      - Perennial.
        - Stem prickly . . . . . 7. *H. diversifolius.*
        - Stem smooth.
          - Bracts exceeding the calyx . . . . . 8. *H. pentaphyllus.*
          - Bracts shorter than the calyx.
            - Flowers numerous, in terminal, ultimately leafless, simple racemes.
              - Flowers crowded, corymbose . . . . . 9. *H. corymbosus.*
              - Flowers remote.
                - Calyx shorter than the ripe fruit . . . 10. *H. Kirkii.*
                - Calyx as long as the ripe fruit . . . . 11. *H. physaloides.*
            - Flowers numerous, in leafy much-branched panicles or cymes . . . . . 12. *H. rhabdotospermus.*
            - Flowers few. Peduncles nearly as long as the floral leaves . . . . . 13. *H. articulatus.*
- Bracts of the epicalyx distinct, forked or provided with a foliaceous appendage. Seeds pilose. (Sect. *Furcaria.*)
  - Plant trailing. Stipules broad, subreniform . . . . . 14. *H. surattensis.*
  - Plant erect. Stipules linear, hispid.
    - Peduncles short. Bracts nearly as long as the calyx . . 15. *H. furcatus.*
    - Peduncles as long as or longer than the petioles. Bracts much shorter than the calyx . . . . . 16. *H. rostellatus.*
- Bracts of the epicalyx united at the base or confluent with the base of the calyx. Seeds not cottony.
  - Epicalyx of 5 bracts.
    - Flowers in terminal generally leafless pseudo-racemes . . 17. *H. lunariifolius.*
    - Flowers not racemose.
      - Sepals broadly ovate, acute . . . . . 18. *H. platycalyx.*
      - Sepals narrow or at least acuminate.
        - Bracts spathulate, acute, subglabrous . . . . . 19. *H. calycinus.*

Bracts oblong, acute, entire. Plant densely villose.
Flower large . . . . . 20. *H. Ludwigii.*
Epicalyx of more than 5 bracts.
Bracts dilated above the middle . . . . . 21. *H. panduriformis.*
Bracts not dilated above the middle.
Leaves without glands. Capsule obtuse . . . . . 22. *H. Grantii.*
Leaves glandular. Capsule pointed.
Leaves entire or with shallow lobes . . . . . 23. *H. Sabdariffa.*
Leaves deeply divided . . . . . 24. *H. cannabinus.*
Bracts of the epicalyx small or none. Seeds cottony. (Sect. *Bombicella.*)
Bracts of epicalyx linear-spathulate, as long as or longer than the calyx . . . . . 25. *H. crassinervis.*
Bracts linear, shorter than the calyx.
Flowers approximate. Column antheriferous at the top . 26. *H. gossypinus.*
Flowers remote. Column antheriferous nearly all the way down . . . . . 27. *H. micranthus.*
Bracts none . . . . . 28. *H. ebracteatus.*
Bracts of the epicalyx small or none. Seeds pilose or smooth, not cottony. (Sect. *Lagunæa.*)
Capsule shorter than the calyx . . . . . 29. *H. ternatus.*
Capsule longer than the calyx . . . . . 30. *H. Solandra.*
Calyx deciduous, long, cleft. Capsule elongate. (Sect. *Abelmoschus.*)
Annual. Peduncles much shorter than the petioles . . . . 31. *H. esculentus.*
Perennial. Peduncles nearly equal to the petiole . . . . . 32. *H. Abelmoschus.*
Calyx persistent. Tall trees. Vernation conduplicate. (Sect. *Paritium.*)
Leaves smooth, leathery, cordate, ovate. Stipules large . . 33. *H. tiliaceus.*
Leaves rough, pentangular. Stipules small . . . . . 34. *H. sterculiæfolius.*

There is, in addition to the above, a species described by Webb from Kordofan,—*H. Muhamedis*,—Webb's description of which will be found at the end of the genus.

1. **H. Trionum,** *Linn.*; *DC. Prod.* i. 453. A much-branched hispid annual, 1 2 ft. high. Leaves 2–3 in. long, on long stalks, roundish, generally deeply palmately 3 5-lobed; lobes variable in shape, coarsely and irregularly toothed, hispid, lower leaves undivided. Peduncles solitary, as long as the petioles, jointed near the top. Epicalyx of 7–12 distinct, linear, ciliolate segments. Calyx ventricose, accrescent, 5-cleft; lobes triangular or obtuse with 3 green hispid nerves. Corolla yellow with a purple centre, larger than the calyx. Capsule oblong, obtuse, blackish, ciliated. Seeds smooth. —*H. vesicarius*, Linn.; DC. Prod. i. 453.

Nile Land. Abyssinia, *Schimper! Dr. Roth!* Upper Egypt and Kordofan, *Kotschy!* Soturba, *Schweinfurth.*

A very widely distributed subtropical weed, extending to S. Africa, Asia Minor, Syria, S. Europe, India, Kashmir, China, and Australia.

2. **H. dictyocarpus,** *Webb Frag. Fl. Æthiop.* 46. Stem woody, erect, much-branched, covered with numerous spreading villi. Petioles 2-4 in. long, villose, longer than the leaves, which are cordate roundish or angular, 3 5-lobed; lobes oblong-lanceolate, coarsely and remotely toothed, central lobe longest, tomentose on both surfaces, palmately 5-7-nerved. Peduncles solitary, axillary, 1 2 in. long, shorter than the adjacent petiole. Epicalyx of 10 12 distinct, linear-oblong, spathulate bracts, equalling the bell-shaped, deeply 5-parted calyx. Calyx-lobes oblong-lanceolate, 3-nerved.

Corolla yellow with a purple centre. Styles 5. Fruit roundish, of 5 membranous carpels provided with membranous wings. Seeds 1 in each cell.—*Pavonia dictyocarpa*, Hochst. in Sched, Kotsch. It. Nub. n. 124.

Nile Land. Ethiopia and Nubia, *Kotschy!*
This has more the habit of *Pavonia* than of *Hibiscus*, but it has only 5 styles.

3. **H. vitifolius,** *Linn.; DC. Prod.* i. 450. A tall, much-branched herb, villose hispid or even aculeate. Leaves on long stalks, cordate, roundish, often deeply palmately 3–5-lobed; lobes oblong or lanceolate, rarely acuminate, coarsely serrate, nearly smooth, or at other times tomentose and villose, central lobe longest. Peduncles solitary, axillary, 1-flowered, shorter than the petioles, jointed in the middle and often crowded at the ends of the branches, so as to form a leafy cluster. Epicalyx of 8–12 distinct, linear, subulate or filiform segments, shorter than the bell-shaped, 5-cleft calyx, the lobes of which latter are broadly lanceolate, 3–5-nerved, and pubescent. Corolla 1–2 in. in length, more than twice the size of the calyx, yellow with a purplish spot. Capsule shorter than the calyx, roundish, depressed, beaked, its 5 valves pergamentaceous, nervose, reticulate, villose, and extended at the edges into foliaceous wings. Seeds tuberculate.—*H. strigosus*, Schum. et Thonn. Pl. Guin. 314. *H. jatrophæfolius*, Rich. Fl. Abyss. i. 58. *H. modaicus*, Hochst.; Rich. Fl. Abyss. i. 56. *H. obscurus*, Rich. Fl. Abyss. i. 57.

Upper Guinea. Cape Coast, *T. Vogel!* Quorra, *Baikie!*
Nile Land. Soturba, *Schweinfurth!* Abyssinia, *Salt! Ehrenberg! Schimper! Pelit!*
Lower Guinea. Congo, *Smith! Burton!*
Mozamb. Distr. Zambesi, Tette, *Dr. Kirk!*
This plant has a wide geographical range, being found in India and Australia, as well as in Africa. It is readily recognized by the capsular wings. The Abyssinian specimens only differ in the more deeply-lobed leaves and the shallower wings to the fruit. The hairiness of the surface is subject to great variations.

4. **H. lepidospermus,** *Mast.* An undershrub, the herbaceous portions covered with fine down. Leaves on very short stalks, linear-lanceolate, denticulate, downy on both surfaces, 4–6 in. long. Stipules linear, persistent, as long as the petioles, ciliated at the margins. Peduncles solitary, axillary, 1-flowered, thickened upwards, as long as or longer than the petioles. Epicalyx of 10 linear ciliolate segments, distinct at the base, half the length of the cup-shaped 5-parted calyx. Calyx-lobes subulate or acuminate, covered with coarse bristly hairs, 3-nerved, 1-glandulose. Corolla yellow, 2–3 in. diam., twice the size of the calyx. Capsule oblong, obtuse, as long as the calyx, its 5 valves hispid, obtuse. Seeds numerous, covered with quadrangular projecting scales, often revolute at the free margin.

Upper Guinea. Niger, *Barter!*
A very distinct species, recognizable by its leaves and curious scaly seeds. It was discovered in swampy situations near the Niger.

5. **H. obtusilobus,** *Garcke in Bot. Zeit.* 1849, p. 837; *Walp. Ann.* ii. 144. Stem herbaceous, 1–8 in. in height, branched glabrous or covered with stellate hairs. Petioles 1–4 in. long, shorter than the leaves, which are cordate ovate-oblong or more or less deeply 3–5-lobed; lobes oblong, obtuse, undulate-crenate, subscabrous, with a few stellate hairs, central lobe longest.

Peduncles solitary, axillary, 1-flowered, longer than the petioles, jointed near the top. Epicalyx of 6–9 distinct, linear-oblong bracts, one-fourth the length of the bell-shaped, 5-parted calyx. Calyx-segments lanceolate, acuminate, 1-nerved, with a few appressed bristles. Capsule woody, oblong, ¾ in. long, equalling the calyx, covered with forked bristles looking upwards; valves 5-pointed, points at first inflexed, ultimately erect. Seeds numerous, reniform, black, tuberculated, not cottony.—*H. amblyocarpus*, Hochst. in Webb, Frag. Fl. Æthiop. 42.

Nile Land. Kordofan, *Kotschy!*

Flowers in November and December. The same plant occurs in Mooltan and Scinde. The leaves are variable in shape.

6. **H. intermedius,** *Rich. Fl. Abyss.* i. 58. A weak erect or half-climbing, much-branched annual, 1–2 ft. high, with scattered, reflexed, prickly hairs, and a line of hairs along one side of the stem which shifts in position at every joint. Leaves on long stalks, polymorphous, usually deeply palmately 5–7-parted; lobes oblong obtuse or rather acute, sinuous or divided into irregular shallow lobes at the margin, sometimes divided at the base into 5–7 narrow lobes. Peduncles solitary, axillary, shorter than the leafstalks. Epicalyx of 10 distinct, linear, strap-shaped segments, shorter than the calyx. Calyx broadly campanulate, 5-parted; segments lanceolate, with 3 green nerves. Corolla small, yellow (purple?). Capsule roundish with a long beak, shorter than the calyx; valves hispid, slightly winged at the margins. Seeds covered with shining hairs.—*H. aristævalvis*, Garcke in Pet. Mossamb. Bot. i. 124.

Nile Land. Abyssinia, *Schimper! Petit!*
Mozamb. Distr. Senna, *Peters! Dr. Kirk!*

In the Kew herbarium are specimens of this plant from Scinde and also from Arabia. The plant varies much in the form of the leaf and has much of the habit of a *Lagunæa*, but has a well-marked epicalyx.

7. **H. diversifolius,** *Jacq. Ic. Pl. Rar. t.* 551; *DC. Prod.* i. 449. A tall herb or undershrub, its branches, petioles, and nerves of leaves armed with hard conical prickles. Leaves on long stalks, cordate, roundish, angular or 3–5-lobed, irregularly toothed, upper leaves elliptic or lanceolate. Flowers in a terminal cluster. Peduncles very short. Epicalyx of numerous subulate segments, often appendiculate, shorter than the densely bristly, pointed calyx-lobes. Corolla yellow or pink?, 3–4 times the length of the calyx. Capsule pointed, very hispid, ultimately smooth. Seeds smooth.—Bot. Reg. t. 381. *? H. berberidifolius*, Rich. Fl. Abyss. i. 56.

Upper Guinea. Senegal, *Perrottet!*
Nile Land. Abyssinia, *Roth!*
Lower Guinea. Congo, *Smith!*
Mozamb. Distr. Manganya hills, *Dr. Meller!* Lower Shire Valley, *Dr. Kirk!*

This well-marked species is found also in S. Africa, Natal, Madagascar, Mauritius, Norfolk Island, and Australia.

8. **H. pentaphyllus,** *F. Muell. Frag. Phyt. Aust.* ix. 13. An undershrub with spreading branches, which, as well as the petioles and pedicels, are clothed with bristly hairs or minute prickles. Leaves 1–3 in. long, stalked, the stalk as long as the blade, the latter palmately 3–5-sect, its seg-

ments oblong-lanceolate, acute, serrate, with numerous forked hairs on the lower surface and a few simple ones on the upper. Peduncles solitary, axillary, 1-flowered, exceeding the leaves. Epicalyx of 8–10 distinct, linear, prickly segments, an inch or more in length. Calyx campanulate, its 5 lobes lanceolate, acuminate, 3–5-nerved, shorter than the epicalyx. Corolla yellow with a dark centre, twice the size of the epicalyx. Capsule ovoid, pointed, half the length of the calyx; valves setose. Seeds numerous, pilose.—Benth. Fl. Austral. i. 214.

South Central. North Shaw Valley, *Baines!*
Mozamb. Distr. Zambesi, Tette, *Dr. Kirk!*
This very distinct species was originally detected in the Deccan, and has since been found in Affghanistan and Scinde, by Stocks, Dalzell, and others. In north Australia it has also been found by various collectors and named by Dr. Mueller, who has the right of priority. The distribution of the plant through India, southern tropical Africa, and north Australia, is an interesting fact.

9. **H. corymbosus,** *Hochst. ex Rich. Fl. Abyss.* i. 57. An erect, slightly-branched perennial, 2–3 ft. in height, beset with stellate tomentum. Lower leaves stalked, 4–5 in. long, 3–4 in. broad, roundish, subcordate, deeply palmately 3-lobed; lobes oblong-lanceolate, rough on both surfaces, coarsely crenate-serrate, the central one longest. Petioles pilose, nearly as long as the blade. Upper leaves simple, subsessile, oblong-lanceolate. Stipules linear, short. Inflorescence terminal, racemose or corymbiform, leafless, owing to the early fall of the floral leaves; pedicels ½–1 in. long, dilated upwards and jointed near the top. Epicalyx of 8–10 distinct linear segments, one-half the length of the bell-shaped, 5-parted calyx, whose segments are lanceolate. Corolla yellow, three or four times the size of the calyx. Capsule ellipsoid, slightly pointed, longer than the calyx; valves downy, ciliated at the edges. Seeds tuberculate.—Walp. Ann. ii. 145.

Nile Land. Abyssinia, *Schimper! Dilton and Petit!*

10. **H. Kirkii,** *Mast.* A much-branched undershrub, densely covered with soft velvety down, mingled among which are scattered trifurcate hairs. Leaves on long stalks, cordate ovate lanceolate oblong or obscurely angled, crenate-serrate, palmately 3–5-nerved. Stipules minute, linear. Peduncles axillary, short, 1-flowered, jointed near the base, often arranged along the side of the leafless branches so as to form a pseudo-raceme. Epicalyx of 7–8 distinct linear segments, much shorter than the calyx. Calyx cup-shaped, 5-parted; lobes deltoid, downy. Corolla three or four times larger than the calyx 2–3 in. in diam., yellow, with a purple centre. Column antheriferous all the way down. Capsule ovate, pointed, longer than the persistent calyx; valves 5, ovate, acuminate, villose. Seeds numerous, subangular, pilose, and minutely tubercled.

Mozamb. Distr. Zambesi, Senna, *Dr. Kirk!*
The short epicalyx with the capsule projecting beyond the calyx furnish good marks whereby to distinguish this species.

11. **H. physaloides,** *Guill. et Perr. Fl. Seneg.* 52. A tall herb or undershrub, 3–6 ft. high, its branches as well as the petioles and pedicels tomentose and hispid. Lower leaves on long stalks, very variable in form, cordate

or hastate at the base, ovate acuminate or somewhat 5-angled or lobed with deltoid pointed lobes, coarsely crenate-serrate, tomentose and hispid. Upper leaves narrower, smaller, often hastate. Peduncles solitary, axillary, 1-flowered, jointed above the middle, equal to or exceeding the leaves, sometimes aggregated into a terminal pseudo-raceme, the leaves of which fall off soon. Epicalyx of about 10 distinct, filiform, ciliolate segments, shorter than the broadly cup-shaped 5-cleft calyx, whose lobes are broadly lanceolate. Corolla purple, more than twice the size of the calyx. Capsule ovoid, beaked, hispid, shorter than the calyx. Seeds with a very few, short, stellate hairs.—*H. heterotrichus*, E. Mey. Plant. Drége. *H. ascendens*, Don, Gen. Syst. i. 482. *H. variabilis*, Garcke in Pet. Mossamb. Bot. i. 126. *H. ribesiæfolius*, Guill. et Perr. Fl. Seneg. i. 53. *H. cæsius*, Garcke in Pet. Mossamb. Bot. i. 125 ?

Upper Guinea, *Don !* Senegal, *Perrottet !*
Nile Land. Madi, *Speke and Grant !*
Mozamb. Distr. Tette, *Peters ! Drs. Kirk and Meller !* Querimba, *Peters.*
The plant is also found in the Canary and Cape de Verde Islands, in Natal and S. Africa, and is subject to considerable variation in minor points. Dr. Kirk's specimens from Senna differ in their prostrate habit and smaller leaves. Perrottet's *H. ribesiæfolius*, authentic specimens of which exist in the British Museum, seems to be a small variety, with a more branching habit and smaller leaves than the type.

12. **H. rhabdotospermus,** *Garcke in Bot. Zeit.* 1849, 839. Perennial (?) with a suffruticose, erect, downy, somewhat villose stem. Leafstalks 2–4 in. long, as long as or longer than the blades. Stipules linear-subulate, pilose; leaf-blades cordate ovate acute or ovate-lanceolate, slightly downy above, more so beneath, palmately 5–7-nerved, coarsely dentate. Peduncles axillary, 1–3 in. long, simple or usually cymosely branched with a small leaf occupying the place of one of the lateral flowers. Epicalyx of 15–20 linear-ciliolate, distinct segments, half the length of the bell-shaped 5-cleft calyx. Calyx-lobes lanceolate, gradually acuminate, downy. Flowers yellow, an inch or more across, larger than the calyx. Capsule woody, ovate, acuminate, loculicidally 5-valved; valves ciliate, as long as the persistent calyx. Seeds brownish, with a few stellate hairs.—*H. cordatus*, Hochst. in Webb, Frag. Fl. Æthiop. 45.

Nile Land. Kordofan, *Kotschy !*
Mozamb. Distr. Lupata, Zambezi, *Dr. Kirk !*

13. **H. articulatus,** *Hochst. in Rich. Fl. Abyss.* i. 66. Rootstock perennial, fusiform, bearing at the summit a number of herbaceous or somewhat woody, erect or spreading, scantily pilose branches, 4–6 in. in length. Leaves on very short stalks, rough on the upper surface, bristly beneath, polymorphous, lower ones roundish, upper ones palmately 3–5-parted; segments oblong-lanceolate, irregularly serrate. Stipules liguliform, persistent. Peduncles solitary, axillary, often as long as the nearly sessile floral leaves. Epicalyx of 8–10 distinct, liguliform, ciliolate segments. Calyx campanulate, 5-parted, its 5 lobes oblong-lanceolate or acuminate, exceeding the epicalyx. Corolla yellow, 1½–2 in. diam., twice the size of the epicalyx. Capsule oblong-ovoid, slightly pointed, its 5 valves downy and hispid along their edges. Seeds smooth.—*H. œnotheroides ?* Webb, Frag. Fl. Æthiop. 47.

Var. *stenolobus*, Hochst. l. c., has narrow lobes to leaf.

Nile Land. Abyssinia, *Schimper!* Nyanzara, White Nile, *Petherick!* Unyoro, *Speke and Grant!*

14. **H. surattensis,** *Linn.; DC. Prod.* i. 449. A weak-stemmed herbaceous plant, straggling over other plants, its branches, as well as the petioles and pedicels, covered with a few soft villi, intermingled among which are a number of recurved bristles. Leaves on long stalks, roundish, deeply and palmately 3–5-fid; segments oblong, serrate, central lobe longest. Stipules large, foliaceous, sessile, subreniform, scarcely acuminate. Peduncles solitary, axillary, 1-flowered, as long as the petiole. Epicalyx of 10–12, linear-spathulate segments each provided on the inner and upper surface with one or more leafy appendages. Calyx broadly cup-shaped, 5-fid, segments triangular, acute, 3-nerved, bristly. Corolla yellow or with a darker spot at the base, 2–3 in. in length, twice or thrice the size of the calyx. Capsule ovoid, beaked, shorter than the calyx; valves villose, ultimately smooth. Seeds reniform, rather downy.—Bot. Mag. 1356. *? H. aculeatus,* Don, Gen. Syst. i. 480.

Upper Guinea. St. Thomas, *Don! Barter!* Old Calabar, *Thomson!* Senegambia, *Perrottet!*

Lower Guinea. Congo, *Smith!*

Mozamb. Distr., *Forbes!* Rovuma and elsewhere, *Dr. Kirk!*

The plant has a wide distribution in South Africa, Natal, India, Borneo, the Philippine Islands, and Australia. Don's *H. aculeatus*, see Walp. Rep. i. 308, perhaps belongs here, if one may judge from the reniform stipules mentioned in the description of that author.

15. **H. furcatus,** *Roxb.; DC. Prod.* i. 449. A coarse annual or perennial, with terete or angular branches, which, as well as the petioles, pedicels, and nerves of the leaves, are covered with coarse bristly hairs or even hooked tubercles. Leaves stalked, cordate-roundish, angular or 3 5-lobed; lobes pointed, crenate-dentate and with a few stellate hairs, especially on the lower surface. Stipules linear-subulate, hispid. Flowers solitary, axillary, on very short peduncles, by the sides of which leafy shoots are sometimes developed. Epicalyx of 10–12 distinct linear segments, nearly as long as the calyx, entire or provided with an accessory lobe. Calyx 5-parted, its segments ovate, with very long points; midribs and margins setose, Capsule ovoid, pointed, about the length of the calyx; valves ovate, oblong, mucronate.

Upper Guinea. Gambia, *Ingram!*

Mozamb. Distr. Zambesi, Tette, *Dr. Kirk!*

A common Indian plant, occurring also at the Cape. From *H. surattensis* it is particularly distinguished by its stipules and by its much broader leaf-lobes.

16. **H. rostellatus,** *Guill. et Perr. Fl. Seneg.* i. 55. Suffrutescent, 3–4 ft. high, hispid, prickly; prickles recurved. Petioles 2–3 in. long, as long or nearly so as the leaves, which are cordate, angular, palmately 5-lobed; lobes deltoid, hispid, crenate-serrate. Stipules linear, short. Peduncles axillary, as long as or longer than the adjacent petioles. Epicalyx of 10 linear segments, much shorter than the calyx, and each provided at the apex with a spoon-shaped appendage. Calyx 5-cleft; segments lanceolate; nerves prominent, setose. Corolla pink, twice the length of the calyx. Sta-

minal column-tube nearly equal to the corolla, bearing the stamens in numerous series; filaments combined in pairs, 2-furcate at the apex (*Guill. et Perr. l. c.*). Ovary obovoid-oblong, densely villose. Capsule ovoid, pointed, densely villose, 5-valved, many-seeded.

Upper Guinea. Senegambia, *Perrottet!*
Lower Guinea. Congo, *Smith!*

17. **H. lunariifolius,** *Wall.; Wight and Arn. Prod. Fl. Pen. Ind.* i. 40. An undershrub, with terete or somewhat angular, hispid or pilose branches. Leaves on long stalks, subcordate, roundish or ovate, acuminate, sometimes obscurely 3–5-lobed, coarsely and irregularly crenate-serrate, smooth above, provided with forked hairs on the under surface. Inflorescence racemose, leafless from early fall of floral leaves. Peduncles shorter than the petioles or densely villose. Epicalyx longer than the calyx, of 5–7 oblong-lanceolate ciliate segments connate below. Calyx bell-shaped, 5-cleft, its segments triangular, acuminate. Corolla yellow, 2–3 in. across, much larger than the calyx. Capsule ovoid or pointed; valves pilose, ultimately glabrous, longer than the calyx, Seeds reniform, pilose.—*H. guineensis,* Don, Gen. Syst. i. 481, non DC. *H. dongolensis,* Delile, Voy. Meröe. 59. *H. macranthus,* Hochst. ex Rich. Fl. Abyss. i. 55.

Upper Guinea. St. Thomas, *Don!*
Nile Land. Abyssinia, *Schimper! Parkyns! Dillon and Petit!* Sennar, *Cienkowski! Kotschy!*
South Central. Lake Ngami, *J. M'Cabe!*
Mozamb. Distr. Tette, *Peters.*
An Indian plant, occurring also in Egypt.

18. **H. platycalyx,** *Mast.* A shrub with terete or angular, woody, ash-coloured or purplish branches. Leaves 4–5 in. long, stalked, cordate, ovate-acuminate, denticulate, sinuous, smooth above, downy and paler on the under surface. Stipules persistent, subulate-aristate. Peduncles solitary, axillary, 1-flowered, shorter than the petioles, dilated and 5-angular at the apex. Epicalyx of 5 distinct, oblong-lanceolate, acute, 3–5-nerved, downy segments, connate at the base and confluent with the base of the bell-shaped 5-lobed calyx. Calyx-lobes broadly ovate, acute, 3-nerved, longer than the epicalyx. Corolla 2–3 in. across, larger than the calyx, pink, with a dark centre; column staminiferous near the top only or with only a very few anthers beneath. Capsule ovoid, pointed, densely downy, equal to the persistent and much enlarged accrescent calyx, and sometimes nodding, when ripe. Valves woody, acuminate. Seeds numerous, reniform, densely hairy.

Mozamb. Distr. Rovuma and Tette, Zambesi, *Dr. Kirk!*
The accrescent broad-leaved calyx supplies a good means of discriminating this species.

19. **H. calycinus,** *Willd.; DC. Prod.* i. 448. An undershrub, its branches, petioles, and peduncles slightly pubescent. Leaves on long stalks, downy or sometimes nearly glabrous, subcordate, roundish, obtusely 3–5-angled, coarsely crenate-serrate. Stipules filiform or subulate. Peduncles solitary in the axils of the leaves, shorter than the petioles, 1-flowered. Epicalyx of 5 broadly spathulate, cuspidate or very acute, many-nerved segments,

confluent with the base of the calyx and equal to or even exceeding it in length. Segments of the calyx ovate-lanceolate, 5-nerved; nerves slightly villose. Corolla yellow, with a purple centre, 2 in. diam. Capsule ½–¾ in. long, shorter than the calyx, ovoid, pointed; valves cartilaginous, smooth, nervose-reticulate. Seeds reniform, covered with short silky hairs.—*? H. owariensis*, P. de Beauv. Fl. Oware, ii. 88. t. 117. *? H. triumfettæfolius*, Schum. et Thonn. Pl. Guin. 312. *H. calycosus*, Rich. Fl. Abyss. i. 62. t. 14. *H. subtrilobatus*, Hochst. Pl. Schimp. Abyss. *H. grandifolius*, Hochst. ex Rich. Fl. Abyss. i. 61.

Upper Guinea. Oware, *Beauvois?*
Nile Land. White Nile, *v. Harnier*; Sennar, *Figari*; Abyssinia, *Schimper! Dillon and Petit!*

This species occurs also in S. Africa. The Abyssinian specimens are subglabrous in every part, and the epicalyx is generally shorter than the calyx.

20. **H. Ludwigii,** *Eck. and Zeyh.* 312; *Harv. and Sond. Fl. Cap.* i. 171. An undershrub, thickly covered with yellowish-brown tomentum. Leaves stalked, cordate-roundish, palmately 3–5-lobed; lobes acute, crenate-serrate. Stalks shorter than the blade. Stipules subulate. Peduncles very short, solitary, axillary, 1-flowered, densely tomentose. Epicalyx of 5 oblong acuminate segments, connate below, nearly as long as the cup-shaped calyx; the lobes of which are of the same form as the bractlets. Corolla yellow, 3–4 in. in length. Capsule exceeding the persistent calyx, ovoid, pointed, densely covered with rufous villi. Seeds slightly pilose.

Nile Land. Abyssinia, *Roth!*
Found also in S. Africa.

21. **H. panduriformis,** *Burm.*; *DC. Prod.* i. 455. A tall perennial or undershrub, densely clothed with fine down, intermingled with which are a few rigid, often stelliform bristles. Leaves stalked, cordate-roundish, angular or lobed, irregularly crenate; the upper ones often narrow, whitish underneath. Peduncles short, axillary. Epicalyx of 6–8 linear spathulate segments, at first equal to, but ultimately shorter than the downy, cup-shaped 5-lobed calyx, whose segments are lanceolate, 1–3-nerved. Corolla yellow, with a purple spot or all purple, 1–2 in. long, three times the size of the calyx. Capsules shorter than the persistent calyx, ovoid or roundish, very hispid. Seeds covered with fine down.—*H. tubulosus*, Cav. Diss. 161. t. 88. f. 22. *H. multistipulatus*, Garcke in Bot. Zeit. 1849, 849. *H. senegalensis*, Guill. et Perr. Fl. Seneg. i. 53.

Upper Guinea. Senegambia, *Perrottet!*
Nile Land. Unyoro, *Speke and Grant!* Sennar, *Heughlin*; *Kotschy! Schweinfurth!* Abyssinia, *Dillon!*
Mozamb. Distr. Zambesi, *Dr. Kirk! Peters.*

Widely distributed throughout the tropics, being found in the Mauritius, India, Australia, etc.

22. **H. Grantii,** *Mast.* An erect, much-branched, villous undershrub. Leaves on very short stalks, roundish or oblong, subcordate, sometimes somewhat wedge-shaped at the base, and slightly 3-lobed at the apex; lobes acute, subacuminate, coarsely and irregularly toothed, 3-nerved. Stipules linear, as

long or longer than the petioles. Flowers numerous, crowded, in terminal leafy panicles. Epicalyx of 12 linear stipule-like villose bracts, united at the extreme base, nearly equalling the cup-shaped 5-lobed calyx, whose lobes are ovate-acute. Petals pink, oblong, 3 or 4 times the length of the calyx. Staminal-tube projecting beyond the corolla. Styles 5, exserted. Capsule pyriform, obtuse, somewhat 5-lobed; valves 5, blunt, slightly winged at the edges. Seeds unknown.

Nile Land. White Nile, *Petherick!* Ugani and Madi, *Speke and Grant!*

23. **H. Sabdariffa,** *Linn.; DC. Prod.* i. 453. Annual or sometimes perennial, with a slightly branched, erect, smooth or slightly hispid, often purplish stem. Leaves stalked; lower ones (and sometimes the upper ones also) undivided, cordate or cuneate at the base, ovate, acute, dentate, palmately 3–5-nerved, with a single gland on the central nerve near the base, smooth or with a few weak hairs on both surfaces; upper leaves generally larger, palmately 3–5-lobed; lobes oblong, lanceolate, the central one longest. Peduncles solitary, axillary, 1-flowered, thickened upwards, much shorter than the leaves. Epicalyx of 8–10, linear-oblong, villose or tuberculate segments, connate below with the base of the calyx. Calyx cup-shaped, longer than the epicalyx, often purplish, 5-parted; segments deltoid, acuminate, studded with asperities, especially on the margins. Corolla yellow, much larger than the calyx. Capsule ovoid, pointed, densely villose, shorter than the calyx; valves leathery, pointed. Seeds numerous, reniform, pilose.

North Central, *E. Vogel!*
Nile Land. Kordofan, *Kotschy!* Sennar, *Hartman;* Unyoro and Ugani, *Speke and Grant!*
Mozamb. Distr. Zambesi, Lower Shire Valley, *Dr. Kirk!*

A commonly cultivated plant in tropical countries, and, like most plants so circumstanced, very variable in stature, form of leaves, etc. In the East and West Indies it is used as a cooling and agreeable article of diet. Dr. Kirk says that it is used by the natives of Africa to flavour broth, and the seeds are reported to be aphrodisiac.

24. **H. cannabinus,** *Linn.; DC. Prod.* i. 450. An erect, branched annual, more or less thickly beset with aculeate tubercles. Leaves on very long stalks, deeply palmately 5–7-lobed; lobes oblong-lanceolate, sinuous, denticulate, or sometimes more deeply divided, smooth on both surfaces or with a few prickly hairs, 1-glandulose on the under surface. Peduncles axillary, short, thick. Epicalyx of 5–7, linear, slightly coherent segments, shorter than the calyx, whose 5 lobes are lanceolate, acuminate, 1-glandulose, their margins and midribs fringed with coarse purplish bristles. Corolla yellow, with a purple centre, three or four times larger than the calyx. Capsule ovoid, pointed, villose, half the length of the calyx. Seeds numerous, slightly pilose.—*? H. obtusatus,* Schum. et Thonn. Pl. Guin. 321. *H. congener,* Schum. et Thonn. l. c. 319. *H. radiatus,* Cav. Diss. 150. t. 154. f. 2; Benth. Fl. Aust. i. 212. *H. verrucosus,* Guill. et Perr. Fl. Seneg. i. 87. *H. asper,* Hook. f. Fl. Nigrit. 228. *H. aculeatus,* Don, Gen. Syst. i. 480.

Cultivated for the sake of its fibre in most parts of Africa.

Upper Guinea. Niger, *Burton! Barter!*
North Central, *E. Vogel!*

Nile Land, *Kotschy! Schweinfurth! Heughlin;* Abyssinia, *Schimper!* Mininga, *Speke and Grant!*
Lower Guinea. Congo, *Smith!*
Mozamb. Distr., *Drs. Kirk and Meller!*

The plant is also widely distributed by cultivation through India and other parts of Asia, and in subtropical Australia.

Very variable in the form and dimensions of the leaves, and to a less extent in the colour of the flowers. *H. radiatus*, Cav., only differs in the absence of calycine glands.

25. **H. crassinervis,** *Hochst. in Rich. Fl. Abyss.* i. 61. An undershrub, its surface covered, except the old wood, with dense rust-coloured stellate rigid pubescence. Branches spreading. Leaves about 1 in. long, 4–5 lines broad, on short petioles, subcordate, oblong-ovate, coarsely and irregularly serrated, 3–5-nerved; nerves prominent. Stipules setaceous, deciduous. Peduncles solitary, axillary, remote or clustered at the ends of the branches, longer than the leaves, jointed above the middle and densely covered with rufous hairs. Flowers small, scarcely ½ in. long. Epicalyx of 7–8, linear-spathulate segments, which equal or even exceed the 5 triangular lobes of the bell-shaped calyx. Corolla pink, exceeding the calyx, pilose on the outer surface. Capsule roundish or ovoid obtuse; valves smooth, obtuse or apiculate, twice the length of the calyx. Seeds cottony.—Walp. Ann. ii. 147. *H. eriospermus*, Hochst. in Pl. Schimp. Abyss. *H. brevipes*, Garcke in Bot. Zeit. 1849, 854. *H. erianthus*, R. Br. in Salt. Abyss. App. 65.

Nile Land. Abyssinia, *Salt! Schimper! Dillon and Petit!*

26. **H. gossypinus,** *Thunb.; DC. Prod.* i. 453. A much-branched undershrub, the rod-like erect branches densely clothed with rust-coloured rigid hairs. Leaves on short stalks, broadly ovate, acute, subcordate or wedge-shaped at the base, serrulate, downy on both surfaces. Stipules linear-subulate. Inflorescence a terminal leafy pseudo-raceme; pedicels longer than the lanceolate floral leaves, densely covered with short reddish stiff hairs, swollen below the flower and jointed above the middle. Epicalyx of 8–12, linear, ciliolate segments. Calyx hispid, deeply divided into 5 lanceolate, 5-nerved segments, longer than the epicalyx. Corolla pink, twice the size of the calyx. Capsule subglobose, obtuse; valves smooth. Seeds cottony.—*H. fuscus*, Garcke in Bot. Zeit. 1849, 854.

Nile Land. Karague hills, *Speke and Grant!* Abyssinia, *Roth! Plowden!*
Mozamb. Distr. Zambesia, Manganya hills, *Drs. Meller and Kirk!*
A handsome plant, extending into Natal and S. Africa; it is variable in the size and form of its leaves and the colour of the corolla.

27. **H. micranthus,** *Linn.; DC. Prod.* i. 453. An undershrub, with long rod-like spreading branches, thinly covered with appressed, stellate, bristle-like hairs. Petioles very short. Leaves about an inch long, oblong, obtuse, wedge-shaped at the base, serrated, 3-nerved, rough with bristly hairs. Peduncles longer than the leaves, jointed near the top; flower half an inch in length. Epicalyx of 7–8, distinct, linear segments. Calyx bell-shaped, 5-cleft; its lobes triangular, longer than the epicalyx. Corolla pink, twice the size of the calyx. Capsule ovoid, smooth, obtuse, three or four

times larger than the calyx. Seeds numerous, cottony.—*H. rigidus*, Linn. f. Supp. 310. *H. clandestinus*, Cav. Ic. 1. t. 2. *H. intermedius*, Hochst. in Pl. Schimp. Abyss. nec Rich. *H. parvifolius*, Hochst. l. c. *H. versicolor*, Schum. et Thonn. Pl. Guin. 311.

Upper Guinea. Cape Coast, *Brass!* Senegambia, *Heudelot!*
Nile Land. Soturba, *Schweinfurth!* Kordofan, *Kotschy!* Abyssinia, *Schimper!*
South Central, *Baines!*
Mozamb. Distr. Zambesi, *Dr. Kirk!* Tette, Senna, *Peters.*
This plant is also distributed in India, Ceylon, Arabia, etc. It varies much in the size of its flowers and leaves, but the variations are not sufficiently marked or constant to allow of their separation into distinct species.
Garcke in Peters' Mossamb. Bot. p. 127, mentions *H. hirtus*, L., the *H. phœniceus* of Willd. (partly), as a native of the island of Mozambique, but the above species is probably the one intended.

28. **H. ebracteatus,** *Mast.* A much-branched undershrub, with rigid, flexuose, shortly jointed branches; the younger ones, as well as the leaves and outer surface of the calyx, densely covered with fine down. Petioles shorter than the leaves, which latter are small, oblong, obtuse, tapering to the base, serrated, ½ in. in length, 3–4 long. Stipules deciduous, liguliform. Peduncles solitary, axillary, 1-flowered, longer than the leaves, thickened below the flower. Epicalyx absent. Calyx bell-shaped, 5-parted; segments triangular. Corolla pink, twice the size of the calyx. Capsule subglobular, half as large again as the persistent calyx, bursting loculicidally by 5 bluntish valves. Seeds numerous, clothed with long cottony hairs.

South Central, *Chapman and Baines!*
A very distinct species, easily recognizable by its habit, the small leaves and flowers, the absence of bracts, etc.

29. **H. ternatus,** *Mast.* An erect, branching, slightly villous herb. Leaves 2–3 in. long, on stalks of the same length or longer; blades subcordate, ovate, acute or palmately 3-lobed; upper leaves more deeply cut. Segments oblong-lanceolate; central one longest, entire or nearly so at the margins, and subglabrous; pedicels as long as the leafstalks, jointed above the middle. Involucel 0. Calyx cup-shaped, deeply divided into 5 lanceolate, acuminate, 3-nerved segments. Corolla less than an inch long, twice the length of the calyx, yellow. Capsule ovoid, pointed, hairy, half the length of the calyx. Seeds angular, tuberculated.—*Lagunæa ternata*, Willd.; DC. Prod. i. 474.

Upper Guinea. Senegambia, *Heudelot! Perrottet!* Quorra, *Barter!*
Nile Land. Kordofan, *Kotschy!* Abyssinia, *Ehrenberg.*
Mozamb. Distr. Zambesi, *Peters;* Shupanga, *Dr. Kirk!*
Var. β. *simplicifolia.* Leaves simple, cordate ovate-lanceolate.—Senegambia, *Perrottet!*

30. **H. Solandra,** *L'Hér. Stirp.* i. 103. *t.* 49. An erect, slightly villose, branching annual. Leaves on long stalks, 3 or 4 in. long, 2 or 3 in. wide, broadly ovate, acuminate, often deeply-palmately 3-lobed; lobes broadly lance-shaped, smooth or with a few villi along the nerves. Peduncles nearly as long as the adjacent leafstalks, arranged along the ends of the branches so

as to form an elongated ultimately leafless pseudo-raceme; bractlets 0. Calyx bell-shaped, deeply divided into 5 lanceolate 3-nerved segments. Capsule ovoid, beaked, longer than the calyx. Seeds blackish, tuberculate. —*Lagunæa lobata*, Willd.; DC. Prod. i. 474.

Mozamb. Distr. River Shire, *Dr. Kirk!*
Occurs also in India.

31. **H. esculentus,** *Linn.; DC. Prod.* i. 450. A tall herb, covered with rough hairs. Leaves on long stalks, cordate, palmately 5-lobed; lobes acute, irregularly serrated. Peduncles axillary, shorter than the petiole. Epicalyx of 9–12 distinct, linear, caducous segments, shorter than the calyx. Calyx tubular, 5-toothed, ultimately somewhat 2-lipped. Corolla large, yellow, with a purple spot at the base. Capsule 4–6 in. long, oblong, acute, smooth or hairy, often sulcate, 5–9-celled. Seeds hairy, striate.—*Abelmoschus esculentus*, Wight and Arn. Prod. Fl. Pen. Ind. i. 53. *A. Bammia*, Webb, Frag. Fl. Æthiop. 48.

Upper Guinea, *T. Vogel! Perrottet!*
Nile Land, *Kotschy! Speke and Grant!*
Naturalized in all tropical countries.

32. **H. Abelmoschus,** *Linn.; DC. Prod.* i. 452. Suffruticose, hispid, the leaves on long stalks, hastate, 3–5-lobed; lobes oblong-acuminate, coarsely and irregularly toothed, often with accessory lobes at the base. Peduncles axillary, 1-flowered, rather shorter than the petiole. Epicalyx of 6–10, linear, hispid lobes, smaller than the calyx; the latter about an inch in length, 5-toothed, split on one side, ultimately deciduous. Corolla yellow, with a crimson centre, three times the length of the calyx. Capsule oblong-lanceolate, hairy, 1½–2 in. long. Seeds scabrous.—*A. moschatus*, Mœnch; Wight and Arn. Prod. Fl. Ind. i. 531.

Upper Guinea. Senegambia, *T. Vogel!*
Lower Guinea. Congo, *Burton!*
Mozamb. Distr. Zambesi, *Dr. Kirk!*
Cultivated in E. and W. tropical Africa, as also in Guiana, W. Indies, Central America, and elsewhere.

33. **H. tiliaceus,** *Linn.; DC. Prod.* i. 454. A small tree with purplish branches, marked with the annular scars made by the deciduous stipules. Leaves on long stalks, coriaceous, cordate orbicular or broadly ovate, acuminate, rarely 3–5-lobed, entire or sinuous, 5–7-nerved, smooth on the upper, hoary on the lower surface, 3–5 in. diam. Stalks shorter than the blades. Vernation conduplicate. Stipules large, foliaceous, oblong-ovate, deciduous. Peduncles somewhat woody, axillary, angular, jointed. Epicalyx cup-shaped, divided about halfway down into 10 or 12 triangular entire teeth, much shorter than the calyx. Calyx nearly an inch long, broadly campanulate, 5-parted; segments lanceolate with a prominent downy nerve. Corolla two or three times the size of the calyx, yellow, with a purple spot at the base. Capsule exceeding the persistent calyx, oblong, pentagonal, downy, 5-valved; valves adhering to the dissepiments, their margins papery, corrugated and turned inwards so as to render the capsule spuriously 10-celled. Seeds slightly pilose.—*H. guineensis*, DC. Prod. i. 454, non Don.

Seacoast of both east and west tropical Africa.

Upper Guinea. Senegambia, *Heudelot!* Sierra Leone, *T. Vogel!* Niger, *Barter!* Fernando Po, *Barter!*

Mozamb. Distr. Zambesi coast, *Dr. Kirk!* Querimba, *Peters.*

This tree is also found along the coasts of Natal, Southern Africa, Mauritius, Seychelles, Madagascar, and in similar situations in India, Java, Brazil, the W. Indies, the islands of the Pacific, and N. Australia. The bark of this tree is said by Dr. Kirk to yield the Miloha fibre to the natives near the Luabo. The flowers are yellow in the morning and become red towards evening. A variety with lobed leaves looks distinct, but as leaves of this form occur on the same trees with those of the ordinary form, there are no grounds for making a distinct variety even.

34. **H. quinquelobus,** *Don, Gen. Syst.* i. 482. A small tree with purplish branches, covered with stellate tomentum. Leaves on short stalks, 5-angled, slightly cuspidate, denticulate, palmi-nerved, leathery, rough, with sparse stellate tomentum. Stipules small, lanceolate, deciduous. Flower-stalks axillary, as long as the petioles, branched and bearing a tuft of small flowers. Epicalyx cup-shaped, divided into 10 linear teeth, half the length of the bell-shaped 5-parted calyx, whose segments are lanceolate, downy externally, and half the length of the corolla. Capsule ovoid, pointed, 5-celled. Seeds covered with small stellate hairs.—*Paritium sterculiæfolium,* Guill. et Perr. Fl. Seneg. i. 60. t. 13. *P. virgatum,* Guill. et Perr. l. c. *P. quinquelobum,* Hook. f. Fl. Nigrit, 227.

Upper Guinea. Senegal, *Afzelius! Perrottet!* Sierra Leone, *Don! Smeathman!*

The typical specimen of Perrottet's preserved in the British Museum has rather larger thinner leaves than are found on the specimens from other collectors, but this depends probably on the locality where the plant grows. This species, by its truly 5-celled capsule, is intermediate between the true *Hibisci* and the so-called genus *Paritium,* of which *H. tiliaceus* is the representative.

H. Muhamedis, *Webb, Frag. Fl. Æthiop.* 46. Stem erect, short, somewhat pilose. Stipules small, linear, acute; lower leaves ovate, rounded at the base, 3-nerved, glabrous, dentate, teeth setigerous. Leafstalks pilose, shorter than the leaves; upper leaves subsessile, lanceolate, obscurely dentate, upper ones linear. Flowers terminal, solitary. Epicalyx of 7 short, linear-lanceolate segments. Calyx 5-cleft; segments lanceolate, acute, pilose, three or four times shorter than the sulphur-coloured corolla. Capsule unknown.

Nile Land. Kordofan (*Webb, l. c.*).

This species is only known to me by Webb's description above cited. Webb speaks of his specimen as unique and as being allied to *H. ovatus,* Cav. Diss. iii. 143. t. 50. f. 3.

12. FUGOSIA, Juss.; Benth. et Hook. f. Gen. Pl. i. 208.

Epicalyx of 3 ∞ small or deciduous bractlets. Calyx 5-cleft. Staminal column truncate or toothed at the top. Ovary 3–4-celled; cells 3–∞-ovuled. Style club-shaped, furrowed, or divided into 3 or 4 club-shaped stigmas. Capsule loculicidally 3 4-valved. Seeds obovoid, glabrous, pubescent or woolly. Albumen very thin. Cotyledons bi-tri-plicate, auricles concealing the base of the straight radicle, not dotted.—Undershrub with palmately-lobed leaves, yellow flowers, and calyx sprinkled with black dots.—*Cienfugosia,* Cav. Diss. iii. 174. t. 72. f. 2.

A small genus, some of the species of which are found in Australia and S. America.

1. **F. digitata,** *Pers.; DC. Prod.* i. 457. Shrubby with erect, rod-like, angular branches, slightly winged at the angles. Leafstalks about an inch in length, shorter than the roundish, deeply palmisect leaves, whose 5–7 lobes are oblong, sinuous or somewhat lobed, nearly smooth on both surfaces. Stipules minute, linear, falcate. Peduncles axillary, as long as or longer than the petiole, angular, dilated towards the top. Epicalyx of 10–12 distinct, minute, linear segments. Calyx bell-shaped, 5-parted; segments oblong, acuminate, 3-nerved, sprinkled with black dots. Corolla yellow, 1–2 in. in diam. Capsule shorter than the calyx, subglobose, mucronate, loculicidally 3–4-valved; valves woody, broadly ovate, mucronate. Seeds covered with reddish cottony down.—*Cienfugosia digitata,* Cav. Diss. iii. 174. t. 72. f. 2.

Upper Guinea. Senegambia, *Heudelot! Sieber! Perrottet!*

13. **THESPESIA,** Corr.; Benth. et Hook. f. Gen. Pl. i. 208.

Bractlets 3–8, small or deciduous. Calyx minutely 5-dentate, rarely 5-cleft. Column toothed at the apex. Ovary 5-celled, each cell with a few ovules. Styles club-shaped, with 5 grooves. Capsule woody, coriaceous, opening loculicidally or almost indehiscent. Seeds obovoid glabrous or tomentose. Cotyledons much folded, enclosing the radicle, often marked with small black dots.—Tall trees or shrubs. Leaves entire or lobed. Flowers yellow.

Distinguished from *Hibiscus* by the confluent stigmas, the more woody capsule, and the obovoid compressed seeds.

Leaves cordate, ovate, acuminate . . . . . 1. *T. populnea.*
Leaves palmately-lobed . . . . . 2. *T. Lampas.*

1. **T. populnea,** *Cav.; DC. Prod.* i. 456. A small tree whose younger branches as well as the petioles, pedicels, and calyx are covered with small peltate scales. Leaves on long stalks, cordate, ovate, acuminate, 7-nerved, smooth, leathery, entire or sinuous. Stipules falcate. Flowers solitary, axillary, stalked. Peduncle shorter than the petiole. Epicalyx of 5 oblong-lanceolate, deciduous segments, as long as or longer than the cup-shaped entire or slightly 5-toothed calyx. Corolla nearly 2 inches in length, four times exceeding the calyx. Fruit roundish, depressed, slightly beaked, 5-celled, indehiscent or opening to a slight extent at the top. Seeds 2 in each cell of the fruit, large, compressed laterally near the hilum, roundish above; testa pubescent, nervose-striate.—*Hibiscus populneus,* Linn. Sp. 976.

Upper Guinea. Senegambia, *Perrottet! Heudelot!*
Mozamb. Distr. Luabo, *Dr. Kirk!* E. tropical Africa, *Speke!*
Distributed probably by cultivation in India, Ceylon, the W. Indies, the Fiji, and Loochoo islands; generally growing in moist situations near the seacoast.

2. **T. Lampas,** *Benth. et Hook. f. Gen. Pl.* i. 209. A tree covered in its herbaceous portions with fine stellate down. Leaves stalked, 3–4 in. across, cordate, palmately 3-lobed; lobes generally very pointed or in some varieties obtuse, sinuous, slightly hairy above, very downy below. Peduncles axillary, 1–3- or more flowered, jointed in the middle, often with a small leaf or bract proceeding from the joint. Epicalyx of 8 or more deciduous segments, rather longer than the calyx, which latter is cup-shaped, 5-lobed; lobes

pointed, much more conspicuous in the bud than in the flower. Corolla three or four times larger than the calyx. Style with 5 spiral groves.—*Hibiscus Lampas*, Cav.; DC. Prod. i. 447; Wight and Arnott, Prod. Fl. Ind. i. 48.

Mozamb. Distr. Zambesi, *Drs. Kirk and Meller!*

In the absence of fruiting specimens, it is not quite certain that Dr. Kirk's plants really belong to this common Indian species. In India, the fruit is an ovate pointed capsule dividing into 5 woody downy valves three or four times exceeding the calyx, and contains shining black seeds. The inflorescence in the Indian form is more branched than in the African. Dr. Meller also found on the Rovuma river some specimens which are here provisionally retained until further evidence shows whether they constitute a variety of *T. Lampas*, or a distinct species. Dr. Meller's plants have large, roundish lobed leaves, the lobes roundish, rough on both surfaces, 1-flowered, jointed peduncles, and an epicalyx of 5 falcate deciduous segments shorter than the calyx; the stigma is spirally grooved. The plant resembles *Hibiscus ferrugineus*, Cav., a native of Madagascar, in its leaves.

14. GOSSYPIUM, Linn.; Benth. et Hook. f. Gen. Pl. i. 209.

Epicalyx of 3 large cordate bractlets. Calyx entire or slightly 5-lobed. Staminal column bearing anthers at the upper part only. Ovary 5-celled; ovules ∞. Fruit capsular, loculicidally dehiscent. Seeds densely woolly, free or slightly coherent.—Herbs or shrubs with lobed leaves and yellow or purple flowers, the bractlets, calyx, and folded cotyledons sprinkled with black dots.

The species of this important genus have been cultivated so widely in all the warmer regions of the globe, and for so long a time, that there is a large number of varieties looked upon by some authors as species; but, however desirable it may be for cultural or commercial purposes to give these numerous forms distinct names, in a work of this character, it appears preferable to retain merely those species concerning which there is little or no difference of opinion among botanists. To adopt any other course would almost necessitate the raising of each individual specimen in the herbarium to the rank of a species.

Cotton easily separable from the seeds. Seeds naked after the removal of the wool . . . . . 1. *G. Barbadense.*

Cotton not readily separable. Seeds often with a dense coating of felted hair beneath the cotton.

Bractlets of epicalyx linear, entire . . . . . 2. *G. anomalum.*

Bractlets of epicalyx broad, more or less toothed, rarely entire.

Lobes of leaf oblong, narrowed at the base, often with a supplementary lobe in the sinus. Flowers purple . . . . . 3. *G. arboreum.*

Lobes of leaf ovate, broad, without supplementary lobes. Flowers yellow . . . . . 4. *G. herbaceum.*

1. **G. Barbadense,** *Linn.; DC. Prod.* i. 456. A small shrub with smooth, purplish, somewhat angular branches sprinkled with black dots. Leaves stalked, 1-glandulose, deeply palmately 3 5-lobed; lobes oblong-lanceolate, acuminate; upper leaves cordate, sometimes entire or waved at the margin; stalks for the most part as long as the blades. Stipules falcate, persistent. Peduncles angular, 1-flowered, shorter than the petioles. Epicalyx of 3 large, cordate, acute, deeply laciniate segments, the central one longer than the others. Corolla yellow. Ripe capsule 1 2 in. long, ovate, glabrous; valves woody, mucronate. Seeds free or combined, covered with

an easily separable white or nankeen-coloured down.—*G. punctatum*, Schum. et Thonn. Pl. Guin. 310. *G. vitifolium*, Lam. Dict. ii. 135. *G. peruvianum*, DC. Prod. i. 456.

Cultivated in many districts of tropical Africa.
Upper Guinea. Abbeokuta, *Irving !* Niger, *Barter !* Sierra Leone, *Burton !*
North Central. Kouka, *E. Vogel !*
Nile Land. Abyssinia, *Dillon and Petit !* Nubia, *Schweinfurth !* lat. 7° S., *Speke and Grant !*
Lower Guinea. Congo, *Burton !*
Mozamb. Distr. Zambesi, Lupata, and elsewhere, "in a wild state," *Dr. Kirk !*
This species is widely diffused by cultivation in the warmer regions of the globe, and furnishes the various sorts of "American Cotton." The Peruvian Cotton, *G. peruvianum*, DC., seems to be only a variety of this species, differing in the coherent seeds. Dr. Kirk mentions this variety as being cultivated by the Makonde people 80 miles inland.

2. **G. anomalum,** *Wawra et Peyritsch, Sert. Benguel.* p. 22. A shrub 5–10 ft. high with rough branches. Leaves stalked, downy on both surfaces, cordate with a single gland on the under surface, the lower leaves palmately 5-lobed, the upper ones 3-lobed; lobes roundish or slightly acute. Flowers opposite the leaves. Bracts of the epicalyx entire, linear-lanceolate, twice the length of the calyx, which latter is cup-shaped, 5-lobed; lobes acuminate. Petals reddish. Capsule ovoid, less than an inch in length, 3-valved; valves tuberculated, woody, acuminate. Seeds 3 or 4 in each cell of the capsule, covered with brownish wool adherent to the seed.—*G. Senarense*, Fenzl in Sched. Kotschy, Iter Æthiop. Coll. 90.

Nile Land. Nubia, *Kotschy !*
Lower Guinea. Angola, Mossamedes, *Dr. Welwitsch !* Benguela, *Wawra !*
A distinct species, the only one truly wild in Africa according to Dr. Welwitsch. The linear segments of the epicalyx, the acuminate calyx-lobes, and the small tubercular capsule, afford good means of discriminating this interesting species.

3. **G. arboreum,** *Linn.; DC. Prod.* i. 456. A shrub attaining the height of 6 8 ft. with slender, purplish, pilose branches. Leaves on long stalks, 1-glandulose, deeply palmately 5–7-lobed; lobes oblong-lanceolate, mucronulate, sinuses between the lobes obtuse, often provided with a supplementary lobe. Stipules falcate. Peduncles as long as the petioles, jointed near the summit and often producing a small leaf at the joint. Epicalyx of 3 cordate, ovate, acute, slightly laciniate or nearly entire segments much longer than the cup-shaped, nearly entire calyx. Corolla purple, twice the size of the epicalyx; column antheriferous for nearly its whole length. Capsule about an inch long, oblong; valves coriaceous or woody, mucronate. Seeds free, covered with long white hairs in addition to a close green felt.

Upper Guinea. Niger, *Barter !* Abbeokuta, *Irving !*
Nile Land. Abyssinia, *Schimper !*
Cultivated in most tropical countries, though but little of the Cotton reaches this country.

4. **G. herbaceum,** *Linn.; DC. Prod.* i. 456. A branching annual or perennial with smooth or slightly hispid branches besprinkled with black dots. Leaves stalked, upper ones ovate, lower ones cordate, palmately 3 5-lobed; lobes broadly oval acuminate entire or sinuous, 3 5-nerved, 1-glan-

dulose on the under surface. Stalks of lower leaves as long as the blades. Stipules lanceolate entire or slightly cut. Peduncles solitary, axillary, 1-flowered, shorter than the petioles. Epicalyx of 3 cordate, ovate, acute, laciniate or rarely nearly entire segments, which are three times longer than the cup-shaped, nearly entire calyx. Corolla yellow with a purple spot at the base, double the length of the epicalyx. Column bearing anthers near the top only. Ripe capsule oblong, obtuse, 1-1½ in. long, 1 in. wide. Seeds free, covered with whitish cotton closely adherent to the seed, often with a brownish "fuzz."—*G. hirsutum*, Linn.; DC. Prod. i. 456. *G. prostratum*, Schum. et Thonn. Pl. Guin. 311. *G. punctatum*, Guill. et Perr. Fl. Seneg. i. 62; Rich. Fl. Abyss. i. 63, nec Schum. et Thonn.

Cultivated in almost every district of tropical Africa.

Upper Guinea. Senegambia, *Perrottet!* Niger, *Barter!* Abbeokuta, *Irving!*

Nile Land. Nubia, *Schweinfurth!* Abyssinia, *Schimper, Dillon and Petit!* White Nile, *Petherick!*

Mozamb. Distr. Zambesi, *Dr. Kirk!*

This species is cultivated in various parts of India, Japan, the south of Europe, etc. The wild form exists apparently in Scinde and Cabul, where it has been found by Stocks and Dalzell. "The leaves in the wild plant have their lobes very rounded, but when cultivated, the plants are not different from the ordinary *G. herbaceum*." (Stocks in Herb. Kew.) The plants vary greatly in the amount of hairiness.

In addition to the above, a *G. puberulum*, Klotzsch, Monog. Gossypii (ined.), is mentioned by name only in Peters' Bot. Mossamb. i. 128. The plant is stated to grow at Senna, on the Zambesi.

15. ADANSONIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 209.

Calyx leathery, cup-shaped, 5-cleft. Petals 5. Column dividing above into a great number of filaments; anthers reniform. Ovary 5–10-celled; cells many-ovuled. Style longer than the stamens, dividing above into as many stigmatic rays as there are cells to the ovary. Fruit oblong, woody, indehiscent, filled with pulp. Seeds reniform. Embryo curved; cotyledons much twisted.—Trees with a comparatively low trunk of vast circumference. Leaves digitate. Flowers white, axillary, stalked, pendulous.

There are two species of this genus, one, the Baobab or Monkey-bread-tree of Africa, also found in W. tropical Asia, where it is cultivated, the other a native of Australia.

1. **A. digitata,** *Linn.; DC. Prod.* i. 478. A tree of moderate height but with a trunk of vast thickness; smaller branches somewhat angular, downy. Leaves stalked, digitate, stalks 4–5 in. long; leaflets oblong entire or sinuous at the margins, acuminate, smooth above, downy below, 2–3 in. long. Peduncles solitary, axillary, 1-flowered, twice the length of the leaves, pendent. Calyx cup-shaped, 5-cleft; lobes oblong, obtuse, leathery, velvety inside. Petals 5, roundish, leathery, white, spreading, ultimately reflected, twice or thrice the size of the calyx, 5–6 in. diam. Column entire below, above broken up into a great number of filaments bearing 1-celled anthers. Style long; stigma of 7–10 spreading rays. Ovary ovate, silky. Flowers in May before the leaves.

Upper Guinea. Senegambia, *Perrottet!* Niger, *Barter!* Quorra, *T. Vogel!*

Nile Land. Ethiopia, *Kotschy!* Abyssinia, *Dillon and Petit, Schimper.*
South Central. Lat. 23° S., *Chapman and Baines!*
Mozamb. Distr. Along the whole coast, *Peters!* Shupanga, *Dr. Kirk!*
This is the famous Baobab or Monkey-bread-tree, known also in India as the Cork-tree. The trunk attains a height of 40–60 ft., while its diameter is no less than 30 ft. The flowers are produced before the leaves. Its bark furnishes cordage, and the pulp of the fruit is slightly acid and refrigerant. The Mozambique specimens have rather narrower leaves than those from other parts of Africa, and they are in some instances smooth on the under surface. The flowers, too, are smaller than those of the tree grown elsewhere. Similar variations occur in India.

16. BOMBAX, Linn.; Benth. et Hook. f. Gen. Pl. i. 210.

Calyx cup-shaped, truncate or obscurely 3–5-lobed. Corolla 5-lobed. Stamens pentadelphous below, each parcel placed opposite to a petal and dividing above into numerous filaments; anthers 1-celled, not sinuous. Ovary 5-celled with many ovules in each cell. Style clavate, dividing at the apex into 5 short stigmatic rays. Capsule woody, loculicidally 5-valved; valves very downy. Seeds roundish. Cotyledons folded.—Tall trees with digitate leaves. Flowerstalks axillary or terminal, solitary or clustered, 1-flowered.

A genus having few representatives in tropical Africa and Asia, but more abundant in America.

1. **B. Buonopozense,** *Beauv. Fl. Owar.* ii. 42. *t.* 83. A large tree with obscurely quadrangular branches, covered by a loose tuberculate bark and having here and there a few stout conical prickles hooked at the points besides being marked by the cicatrices of the leaf and flowerstalks. Leaves stalked, digitate; stalks 3–6 in. long, cylindrical; leaflets 5–7, oblong, attenuate at the base, acuminate, apiculate, entire, smooth on both surfaces. Pedicels solitary, axillary, about an inch in length, cylindrical, curved. Calyx cup-shaped, entire, leathery, covered with a few stellate hairs on the outside and thickly clothed with simple hairs within. Corolla scarlet, three or four times longer than the calyx, of 5 oblong, obtuse, leathery lobes, which are densely covered with stellate pubescence on the outside. Stamens pentadelphous below, shorter than the corolla, each parcel dividing below the middle into a great number of hairy filaments. Style clavate; stigmas 5, radiate.

Upper Guinea. Niger, *Barter!* Sierra Leone, *Miss Turner!* Senegambia, *Perrottet!*
Dr. Hooker, in the 'Niger Flora,' 232, describes the leaves of a plant in the Kew herbarium as possibly belonging to this species, but they are ciliate-serrate near the top, not entire, and do not correspond with Palisot's figure or with Perrottet's specimens in the British Museum. There is no evidence at present as to what species they properly belong.

17. ERIODENDRON, DC.; Benth. et Hook. f. Gen. Pl. i. 210.

Calyx cup-shaped, 5-lobed. Staminal column divided at the apex into 5 divisions, each bearing 3 sinuous anthers. Ovary 5-celled; ovules numerous. Style club-shaped, pentagonal. Capsule coriaceous, downy within. Seeds obovoid, embedded in wool.—Spiny tree, with digitate leaves and large axillary or terminal rose-coloured or white flowers.

Represented in Africa by a single species, which is also found in the E. and W. Indies.

1. **E. anfractuosum,** *DC. Prod.* i. 479. A large tree spiny when young; trunk dilated at the base. Branches verticillate. Leafstalks 4–6 in. long, terminating in a small, suborbicular disk from which proceed in a digitate manner 7 shortly stalked, lanceolate, acuminate, undulate leaflets, smooth on both surfaces, 4–6 in. long, 1–1½ in. wide. Calyx ¾ in. long, leathery, cup-shaped, with 5 shallow rounded lobes. Corolla three or four times the length of the calyx. Petals oblong, obtuse, rose-coloured, villous outside, glabrous within. Stamens united into 5 bundles, each bearing 3 sinuous anthers. Capsule ovate-oblong, 5–8 in. long, 5-valved, many-seeded. Seeds woolly.—*Bombax pentandrum*, Linn. Sp. 959. *B. guineense*, Schum. et Thonn. Pl. Guin. 302.

Upper Guinea. Senegambia, *Perrottet! Thonning.*
Lower Guinea. Congo, *Smith!*
This species occurs also in both the E. and the W. Indies. Thonning says his *Bombax guineense* differs from *B. pentandrum* in the branches, which do not spread at a right angle, and in the paucity of spines.

Order XXVI. STERCULIACEÆ (by Dr. Maxwell T. Masters).

Flowers regular, hermaphrodite or unisexual. Calyx usually persistent, more or less deeply divided into 5 or rarely 3 or 4 valvate lobes, or rarely splitting irregularly into 2 valves, still more rarely the sepals entirely free. Petals 5, hypogynous, free or adhering to the staminal column, contorted-imbricate in the bud or small and scale-like or none. Stamens usually united into a ring, a cup or a tube with 5 terminal teeth or lobes (staminodia) alternating with or opposite to the petals, and 1 or more anthers sessile or stipitate (on distinct filaments) in each interval, the anthers 2-celled and opening outwards by longitudinal slits, or exceptionally, the anthers are numerous and the staminodia are wanting, or the stamens are 5, free and alternate with the sepals or the anther-cells confluent or opening by terminal pores. Ovary free, 2–5-celled, with the carpels more or less united, rarely 10–12-celled or reduced to a single carpel. Styles entire or divided into as many branches as there are cells or rarely styles free, equal in number to the cells. Fruit various. Seeds sometimes hairy but not cottony, sometimes arillate; testa coriaceous fibrous or membranous; tegmen horny; albumen fleshy farinaceous or horny, entire or bipartite or none. Cotyledons flat or folded thin or fleshy, distinct or adherent to the biparted albumen. Radicle short, near to or sometimes remote from the hilum.—Herbs shrubs or trees, the tomentum or hairs stellate, rarely mixed with simple hairs. Leaves alternate or exceptionally opposite, simple and pinnately or palmately nerved, entire toothed or lobed or digitately compound. Stipules sometimes absent.

A large Order, chiefly tropical, dispersed over the New and the Old World, and Australia.

Tribe I. **Sterculieæ.**—*Flowers unisexual or polygamous. Calyx sometimes coloured. Petals* 0. *Anthers* 5–15, *adnate, crowded at the extremity of a long column or a short gynophore around the base of the ovary.*

Anthers crowded into a head. Seeds albuminous.

Calyx 4–5-fid. Carpels 4–5 . . . . . 1. STERCULIA.
Calyx 8-fid. Carpels numerous . . . . . 2. OCTOLOBUS.
Anthers in a single row, verticillate. Albumen wanting.
Anthers 10–12. Fruit usually dehiscent . . . . . 3. COLA.
Anthers 5. Fruit indehiscent . . . . . 4. HERITIERA.

TRIBE II. **Helictereæ.**—*Flowers hermaphrodite. Petals* 5, *deciduous. Anthers* 15, *cells divergent, alternating with small staminodia.*

Capsule stipitate, membranous, inflated . . . . . 5. KLEINHOVIA.

TRIBE III. **Dombeyeæ.**—*Flowers hermaphrodite. Petals usually persistent, flat. Anthers* 5–20, *cells parallel. Staminodia* 5. *Capsule sessile. Cotyledons cleft.*

Bractlets caducous or none. Stamens 3, between each pair of staminodes . . . . . 6. DOMBEYA.
Bractlets persistent. Stamens solitary between the staminodes . . 7. MELHANIA.

TRIBE IV. **Hermannieæ.**—*Flowers hermaphrodite. Petals flat. Stamens* 5, *distinct. Staminodes none. Cotyledons entire.*

Ovules numerous. Embryo curved.
Filaments dilated at the apex . . . . . 8. HERMANNIA.
Filaments dilated in the middle . . . . . 9. MAHERNIA.
Ovules 2 in each cell of the ovary. Embryo straight.
Ovary 5-celled . . . . . 10. MELOCHIA.
Ovary 1-celled . . . . . 11. WALTHERIA.

TRIBE V. **Buettnerieæ.**—*Flowers hermaphrodite. Petals concave, often with an appendage at the apex. Anthers at the margins of a funnel-shaped staminal tube, between the staminodes.*

Anthers numerous, between the staminodes.
Petals obovate, concave, exappendiculate. Anthers sessile. Staminodia short, broad . . . . . 12. SCAPHOPETALUM.
Petals minute. Anthers on long filaments. Staminodia linear . 13. LEPTONYCHIA.
Anthers solitary between the staminodes . . . . . 14. BUETTNERIA.

1. STERCULIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 217.

Flowers unisexual or polygamous. Calyx 4–5-cleft or -parted, often coloured. Petals 0. Column bearing 10–15 anthers in a capitate head. Ovary 5-celled, each cell with 2–∞ ovules. Styles consolidated; stigmas 5-lobed. Ripe carpels separate, spreading, woody or leathery, ultimately splitting longitudinally, at other times thinner, membranous or subfoliaceous, opening very early. Seeds 1 or several. Albumen splitting into 2 segments, adherent to the cotyledons, and thus often assuming the appearance of the cotyledons, the latter are flat and thin; radicle directed towards the hilum or away from it.—Trees with entire or lobed leaves. Flowers in axillary or terminal panicles.

A large genus whose species are most abundant in tropical Asia. Although there is a general coincidence in habit and in the flowers, yet the fruits and the seeds are so variable that by many they have been made the grounds for separation into distinct genera. The varying position of the radicle with reference to the hilum particularly needs the study of the fresh specimens in all stages of development.

Follicles woody or leathery dehiscing, when ripe.
  Leaves oblong, obovate, entire, unicostate.
    Leaves pilose at least beneath . . . . . 1. *S. Tragacantha.*
    Leaves glabrous on both surfaces . . . . . 2. *S. oblonga.*
  Leaves roundish, angular or lobed, palmicostate.
    Leaves subglabrous.
      Lobes of leaves pointed . . . . . 3. *S. Triphaca.*
      Lobes of leaves rounded or none . . . . . 4. *S. cordifolia.*
    Leaves downy on both surfaces.
      Lobes of leaf acute; not white underneath . . . . . 5. *S. tomentosa.*
      Lobes of leaf acuminate, white underneath . . . . . 6. *S. cinerea.*
Follicles membranous, thin, splitting before the seed is ripe. (Sect. *Firmiana.*) . . . . . 7. *S. Barteri.*

1. **S. Tragacantha,** *Lindl. Bot. Reg. t.* 1353. A tree 40–50 ft. high, with rugged greyish bark; younger shoots as well as the leafstalks, under surface of the leaves, pedicels, calyx, and outer surface of the follicles, clothed with rufous down. Leafstalks 1–2 in. long. Leaves leathery, oblong, obtuse at the base, blunt or subacuminate at the apex or even slightly 3-lobed, entire or sinuous, unicostate, feather-veined. Flowers small, numerous, in much-branched clusters; pedicels jointed. Calyx funnel-shaped, red, 5-toothed; lobes oblong, cohering at the apex. Column shorter than the calyx. Anthers in 2 rows. Follicles 5, stipitate, oblong acute or slightly cuspidate, covered with close reddish down, 2–4 in. long, 1½ in. across.—*S. pubescens,* Don, Gen. Syst. i. 615. *S. obovata,* R. Br. Pl. Jav. Rar. 233.

Upper Guinea. Cape Coast, *Brass!* Niger, *Barter!* Senegambia, *Heudelot!* Sierra Leone, *Don!*
Lower Guinea. Congo, *Smith!*

2. **S. oblonga,** *Mast.* A tree 50 ft. in height with spreading branches (*Mann*). Leafstalks flattened, 1–2 in. long. Leaves longer than their stalks, rounded at the base, oblong acute or roundish, rarely subacuminate, sinuous at the margins, unicostate, glabrous on both surfaces. Flowers numerous, small, in terminal, leafless, much-branched, panicled cymes. Bracts small, deciduous. Flower-buds oblong, obtuse. Calyx downy on both surfaces, cup-shaped, deeply 5-parted; segments oblong, obtuse, at first valvate, ultimately spreading. Staminal column slender, hairy at the base, shorter than the calyx. Anthers numerous, in a globose head; lobes parallel. Ovary and fruit not known.

Upper Guinea. Fernando Po, *Mann!*
Apparently a distinct species, but imperfectly known.

3. **S. Triphaca,** *R. Br. Pl. Jav. Rar.* 221. A large tree, with thick, greyish, rugose branches. Leafstalks 4–5 in. long, as long as the leaves, subglabrous. Leaves cordate, roundish or 3-lobed; lobes entire, acuminate, central one longest, nearly glabrous on both surfaces. Flowers numerous in much-branched axillary panicles. Peduncles downy, 2–3 in. long; pedicels jointed, shorter than the flower. Calyx less than ½ in. long, downy on the outside, smooth and pink within, divided halfway down into 5 ovate-lanceolate spreading segments. Column smooth, shorter than the calyx; anthers clustered at the top of the column or in 2 rows round the base of an abortive

pilose ovary. Follicles 3–5, spreading, subsessile, ovate-acuminate, downy on the outer surface. Seeds arillate on a villose placenta.—*Triphaca africana*, Lour.; DC. Prod. i. 483. *S. abyssinica*, R. Br. Pl. Jav. Rar. 227 (partly); T. Anderson in Journ. Linn. Soc. v. Suppl. 9. *S. ipomœæfolia*, Garcke in Pet. Mossamb. Bot. i. 130.

Nile Land. Abyssinia, *Salt!*
Mozamb. Distr. Zambesi, *Dr. Kirk!* Senna, *Peters.*

There is no doubt, as Dr. Anderson has pointed out, that R. Brown confused two species under the head of *S. abyssinica*, and that Garcke's *S. ipomœæfolia* is identical with R. Brown's *S. Triphaca*. It seems, therefore, best to adopt the oldest name, and refer to it, in part, R. Brown's *S. abyssinica*. *S. arabica*, T. Anders., the fruit of which Brown referred to his *S. abyssinica*, has not been found in tropical Africa.

4. **S. ? cordifolia,** *Cav.; Guill. et Perr. Fl. Seneg.* i. 79. *t.* 15. A large tree, 60–80 feet high; the bark of which peels off like that of the Plane. Branches spreading; younger ones puberulous. Leafstalks 1–5 in. long, downy. Leaves cordate, roundish, sinuous, entire or slightly lobed, coriaceous, glabrous on both surfaces or slightly stellate-pilose, especially beneath, 5–6 in. or more long, somewhat less in breadth. Flowers numerous, small, in much-branched axillary clusters; pedicels divaricate, downy. Calyx urceolate, 3-toothed, downy on the outside. Stamens 10–12, very short, placed around the ovary or crowded in a globose head at the extremity of a long stalk and surrounding an abortive ovary. Carpels 5, spreading, thick, acuminate, tapering at the base, smooth within, 8–10-seeded. Seeds with a yellow aril, exalbuminous (?).

Upper Guinea. Senegambia, *Heudelot! Perrottet!*

Not having examined perfect flowers of this species, I adopt the description given by Guillemin and Perrottet. Their figure of the column and anthers hardly agrees with their description, and seems to represent either a single ring of anthers, with superposed lobes, as in *Cola*, or a double ring of anthers with parallel lobes. The aril is said to be edible. Cavanilles' figure of the fruit (Diss. v. t. 144) belongs rather to *S. tomentosa*, as pointed out by Guillemin and Perrottet. Robert Brown, Pl. Jav. Rar. 237, refers this plant to his genus *Cola*, "ob antherarum loculis divaricatissimis, seminibus exalbuminosis et radicula embryonis hilo proxima," etc. But Guillemin and Perrottet describe the anthers as congested in a globose head, though their figure does not correspond with the description. Their account of the seeds having an arillus, and of the embryo as having thick flat cotyledons, renders it probable that there is some confusion also as to the seeds, of which latter they give no figure. The habit and structure of the flower, as described, are more nearly those of *Sterculia* than of *Cola*.

5. **S. tomentosa,** *Guill. et Perr. Fl. Seneg.* i. 81. t. 16. A tree 20 30 ft. high. Branches rugose; younger ones downy. Leaves approximate, stalked; petioles 3–4 in. long, downy; laminæ cordate, roundish, angular or somewhat 3-lobed; lobes acuminate, the central one longest, downy on both surfaces. Flowers numerous, in much-branched axillary panicles; pedicels spreading, downy, as long as or longer than the flower. Flower-buds broadly ovate. Calyx ½ in. long, cup-shaped, downy, 5-fid; lobes lanceolate, valvate in the bud, ultimately spreading. Staminal column curved, slender, half the length of the calyx, dividing at the extremity into 5 short branches each of which supports three 2-lobed anthers; lobes parallel, surrounding an abortive pilose ovary, with a single curved style. Carpels 3–5,

sessile, obliquely oblong, acuminate, ventricose on the upper surface, dehiscing longitudinally, densely tomentose on the outer surface, setose within along the placental line. Seeds numerous, oblong-ovate; testa purplish; tegmen horny, with a yellow horny arillus near the hilum. Albumen 2-parted. Cotyledons flat, adhering to the albumen; radicle turned away from hilum.—*? S. setigera*, Delile. Voy. Meröe, 61.

Upper Guinea. Niger, *T. Vogel!*
North Central. Musgu, *E. Vogel!*
Nile Land. Abyssinia, *Schimper!*
Lower Guinea. Loanda, *Admiral Grey!*

This is one of the plants called "Kola" by the natives, though it does not furnish the Kola nuts of the African markets. Delile describes a fruit, under the name of *S. setigera*, which may belong here.

6. **S. cinerea,** *Rich. Fl. Abyss.* i. 74. *t.* 16. A tree of moderate height, with spreading, rugose, tubercled, greyish branches; younger shoots, petioles and pedicels covered with dense grey tomentum. Leaves on very long stalks, cordate, palmately 3–5-lobed, 4–5 in. long and nearly as broad as long; lobes entire or sinuous, with long points, stellate-pilose above and villose along the nerves, densely cinereo-tomentose below. Flowers numerous, in much-branched axillary panicles. Calyx broadly cup-shaped, ⅓ in. long, tomentose on the outside, pinkish within, divided halfway down into 5 lanceolate spreading lobes. Staminal column slender, curved, scarcely so long as the calyx, terminating in a subglobose head of anthers. Follicles 3 5, sessile, spreading, oblong-acuminate, reflexed at the point, downy outside, setose within, especially along the placenta. Seeds numerous, oblong, blackish, with a yellow aril.

Upper Guinea. Niger, *Barter!*
Nile Land. Sennar, *Kotschy!* Abyssinia, *Schweinfurth! Dillon and Petit!* Madi, *Speke and Grant!*

Very like *S. tomentosa*, Guill. et Perr., and perhaps only a variety of it. Its very acuminate leaf-lobes and their grey under-surfaces, suffice to give the plant a distinct aspect.

In the Kew Museum are fruits probably of this species, from Mr. Baines, who gathered them in S. tropical Africa. The follicles are 3–4 in. long, sessile, oblong-acuminate, downy on both surfaces, and studded with rather long stinging bristles along the placenta. The seeds are numerous, oblong, ¼ in. in length, nearly double the size of those of *S. tomentosa*; they have a purplish testa and a horny tegmen, with a yellow horny aril at the base. Mr. Baines speaks of it as the Kookomboya-tree. There is, in the herbarium, a fragment of a flowering branch, with a drawing and notes from Dr. Kirk, referring, probably to the same tree.

7. **S. Barteri,** *Mast.* A tree 30–40 feet high. Branches thick, covered with loose, smooth, reddish-yellow bark. Leafstalks 3–4 in. long. Leaves cordate-roundish, acuminate, sinuous, palmately 7-nerved, smooth on both surfaces or with a few stellate hairs beneath, 4 8 in. long. Flowers numerous, in loose branching panicles; pedunicles shorter than the leaves; pedicels ¼–½ in. long, jointed. Perianth ¾ in. long, scarlet, leathery, tubular, gibbous at the base, contracted in the middle and divided at the limb into 5 short, ovate, acute, leathery teeth, downy externally, smooth within except at the base, where there are a few villi directed downwards. Staminal column

rather shorter than the perianth. Anthers in 2 rows. Ovary . . . Fruit supported on a long gynophore, twice the length of the persistent perianth, of 5, spreading, membranous, oblong, 1-seeded follicles, each about 2 in. in length. Seeds smooth.

Upper Guinea. Niger, *Barter!*

According to Mr. Barter, this tree, like many others, is leafless in the dry season, and the scarlet flowers are produced before the new leaves. The wood is light and used for floats for fishermen's nets. The bark is described as resinous, with a disagreeable odour. The species resembles the Indian *S. (Firmiana) colorata*, but the flowers are much smaller and contracted in the centre, while in the Indian plant the perianth is funnel-shaped. The fruits do not appear to open so early in the African as in the Indian species.

In the Kew Museum are specimens of a Sterculiaceous fruit, from the Rovuma river, collected by Dr. Kirk, without leaves or flowers, and of which no corresponding specimens exist in the herbarium. As the fruits and seeds seem distinct from any other African species, a description is appended.—Follicles 4–(5?), spreading, oblong, cylindrical, subsessile or on a short very thick stipes, slightly acuminate or rostrate at the apex, woody, densely covered with a ferruginous tomentum, whitish within. Seeds numerous, oblong, obtuse, subtetragonal, nearly an inch in length, suspended by rather long, slender, funicles; testa coriaceous, bright yellow, apparently succulent when fresh; tegmen dark brown, thicker than the testa, horny; albumen horny; radicle next the hilum.

Dr. Kirk adds that the outer portions of the seed yield an abundance of oil. Is this referable to *Cola quinqueloba*, Garcke? From the same botanist are specimens, labelled, "Tette, 2. Common, from Batoka to Shupanga, Nov. 1860;" and another, "Rovuma, small tree. Leaves palmate." These two specimens are evidently of the same species, both are said to yield oily seeds, but they appear different from that above described. No leaves or flowers accompany the specimens, which consist merely of fruiting-branches, bearing at their extremities 4–5 verticillate, woody follicles, each raised on a slender stipes, ½ in. in length and oblong acuminate, somewhat compressed, often arcuate, in form, covered with reddish down on the exterior, less thickly so on the inner surface, widely dehiscent along the ventral suture. Seeds immature, purplish. The follicles appear to burst early, as in *Firmiana*, but they are thick and woody in texture and a whitish gum exudes from them.

2. OCTOLOBUS, Welw. in Linn. Trans. xxvii. ined.; Benth. et Hook. f. Gen. Pl. i. 982, addenda.

Flowers unisexual. Calyx-tube subcylindrical; limb campanulate, 8-lobed; lobes coriaceous, margins membranous, induplicate, corrugate. Petals 0. Staminal column cylindrical, short, placed on an elongated conical tomentose stipes; anthers very numerous, connate, in an orbicular depressed head. Carpels very numerous, distinct, clustered in a globose head raised upon a short gynophore and encircled by a ring of staminodia, each carpel ovoid, tomentose, 1-celled. Stigma sessile, 2-lobed. Ovules numerous, in two rows. Ripe carpels 8–12, distinct, stalked, obovoid, gibbous, terminating in a recurved beak, 2-seeded. Seeds subglobose, sessile, with an orbicular hilum; testa membranous; albumen 0; embryo subglobose; cotyledons very thick; radicle very short, plumule pilose.—A tree with stout spreading branches. Leaves alternate, on long stalks; petioles thickened at the apex; blade of leaf obovate-lanceolate, obtusely acuminate, coriaceous, smooth. Stipules lateral, erect, very acute. Flowers large, sessile, solitary, fulvous-villose.

Only known to me from the above description extracted from Benth. and Hook. l. c.

3. COLA, Schott; Benth. et Hook. f. Gen. Pl. i. 218.

Flowers unisexual or polygamous. Calyx 4- or 5-cleft. Petals 0. Column sometimes very short, bearing 10–12 anthers, disposed in a single row; anther-cells parallel or superposed. Ovary 5–10-celled. Ovules numerous. Styles as many as the cells of the ovary. Fruit of 4 or 5 leathery or woody oblong carpels, ultimately splitting lengthwise. Seeds numerous, obovoid, exalbuminous; cotyledons thick, sometimes 2-parted; radicle next to the hilum.—Trees. Leaves entire or lobed. Flowers in axillary clusters.

Anther-cells divergent, superposed . . . . . 1. *C. acuminata.*
Anther-cells parallel.
  Leaves simple.
    Flowers in dense clusters from the old wood . . . . . 2. *C. cauliflora.*
    Flowers numerous, in axillary clusters. Branches angular . . 3. *C. laurifolia.*
    Flowers few, in short axillary clusters.
      Fruit downy, sessile . . . . . 4. *C. Gabonensis.*
      Fruit smooth, stipitate, 1-seeded . . . . . 5. *C. clavata.*
  Leaves palmately lobed.
    Leaves rounded at the base . . . . . 6. *C. ficifolia.*
    Leaves cuneate at the base . . . . . 7. *C. heterophylla.*
    Leaves cordate at the base.
      Fruit smooth . . . . . 8. *C. Afzelii.*
      Fruit densely downy . . . . . 9. *C. quinqueloba.*
  Leaves digitate.
    Leaves silvery beneath . . . . . 10. *C. argentea.*
    Leaves not silvery beneath. Fruit splitting early, crimson within . . . . . 11. *C. digitata.*

1. **C. acuminata,** *R. Br. Pl. Jav. Rar.* 237. A tree, 20–30 feet high, with cylindrical smooth branches. Petioles 1–3 in. long, thickened at the apex; blades 3–6 in. long, 1–2 in. broad, coriaceous, tapering at the base, oblong-acuminate, entire or slightly sinuous and revolute at the margins, smooth, or when young with a few brownish stelliform hairs, 1-costate, arcuate-venose, often with the lower pair of secondary veins more prominent than the others. Flowers numerous, polygamous, in terminal and axillary cymose panicles. Peduncles shorter than the petioles, stellate-tomentose. Flower-buds subglobose. Calyx cup-shaped, ½ in. or more in diam., coriaceous, slightly stellate-tomentose on the exterior, marked with purplish striæ on the inner surface; limb 5–6-cleft; lobes ovate-lanceolate, ultimately spreading. Male fl.: Column slender, much shorter than the calyx, bearing a ring of 10 2-lobed anthers; anther-lobes divergent, superposed. Hermaphrodite fl.: Anthers subsessile in a ring surrounding the base of an oblong stellate-pilose, 5-lobed, 5-celled ovary. Styles 5, linear, subulate, reflexed. Ovules numerous, anatropal, attached in a double row to the ventral suture of each carpel. Fruit of 5 follicles or fewer by abortion, each one sessile or subsessile, oblong, obtuse or rostrate, coriaceous or woody, smooth or tuberculate, 3–6 in. long, 2–3 in. thick. Seeds 6–12 in each follicle, oblong, obtuse, subtetragonal; testa purplish, cartilaginous. Cotyledons 2, 3–4 or even 5, thick, horny, appressed, flat; radicle directed towards the hilum.—*Sterculia acuminata,* Pal. de Beauv. Fl. Owar. i. 41, t. 24; Bot. Mag. 5699.

Upper Guinea. Sierra Leone, *Don ! Dr. Daniell ! Dr. Kirk !* Fernando Po, *Mann ! Barter !* St. Thomas, *Don !* Niger, *Barter !* Gaboon, *Mann !* Prince's Island, *Barter !*

Var. *β.* Leaves broader and with shorter stalks than in the type, and with the flowers nearly double the size.—Hook. f. Fl. Nigrit. 233. *Sterculia nitida*, Vent. Jard. Malm. ii. 91 adnot. *S. verticillata*, Schum. et Thonn. Pl. Guin. 240. *S. macrocarpa*, Don, Gen. Syst. i. 515. *Siphoniopsis monoica*, Karsten, Fl. Columb. 139 t. 69.

Var. *β.* **Upper Guinea.** Sierra Leone, *Afzelius !* St. Thomas, *Don !* Fernando Po, *Mann ! Vogel !*

Lower Guinea. Congo, *Smith !*

This tree furnishes the Cola nuts, so much esteemed by the natives for their bitter flavour, and which are said to enhance the taste of whatever is eaten after them. It varies very much in the size and form of the leaves and flowers, the appearance of the pods, the colour of the seeds, and even the presence of from 2–5 separate and distinct cotyledons. Whether these variations depend upon cultivation or not, it is not easy to decide; whether or no, numerous intermediate gradations between the different forms may be traced. The number of cotyledons varies even in seeds taken from the same pod. Barter says that the nuts with 4 cotyledons are not so much prized as those with 2 in the native markets. Karsten gives an admirable figure of the plant, but not having the fruit he mistook it and constituted of it a new Terebinthaceous genus. The tree has been introduced into the W. Indies, S. America, etc., the form usually cultivated being the broad-leaved, large-flowered one.

The name Cola or Kolah seems to be also applied to several other Sterculiaceous seeds, but those of *C. acuminata* and its varieties are those most prized in the native markets. The "Bitter Cola" of Fernando Po is the produce of some other tree, some *Guttifera.*

Under this head, too, I would place, provisionally, specimens gathered by Barter at Eppah, and by Mann at Old Calabar! of which only leaves and imperfect fruits exist in the Kew herbarium. The leafstalks are not so much thickened at the apex as in the true *C. acuminata*, and the leaves themselves are thinner in texture, and in one instance show a tendency towards lobing. The fruit is borne on thick axillary stalks, and consists of 2–4 sessile, oblong, acuminate, coriaceous, reddish carpels.

Closely allied also to *C. acuminata* are some specimens from Abbeokuta, from Dr. Irving, They differ principally in the membranous leaves and smaller flowers. The latter are in terminal panicles and have the structure of *Cola acuminata*, but are scarcely ¼ in. in diam. In the absence of further information, the plant is merely mentioned in this place; it may ultimately prove to be a distinct species.

2. **C. cauliflora,** *Mast.* A shrub or small tree, 10–20 ft. high (*Mann*). Branches cylindrical, covered with a greyish-rugose bark. Leaves subsessile or with stalks 2 in. in length, thickened at the apex; blades coriaceous, glabrous, 3–8 in. long, oblong or elliptical, tapering at the base or somewhat rounded, acuminate or rarely rounded at the apex, undulate or entire, 1-costate, smaller veins arcuate-reticulate. Stipules lanceolate, ½ in. long, deciduous. Flowers numerous, in clusters from out of the old wood; pedicels slender, ½–1 in. long, as well as the calyx, covered with fine reddish down. Calyx of the male flower larger than that of the hermaphrodite flower, broadly campanulate, 5-lobed; lobes oblong-lanceolate. Column slender, shorter than the calyx, surmounted by a ring of 2-lobed parallel anthers. Hermaphrodite fl.: Calyx similar, but smaller, ¼–⅓ in. in diam. Anthers subsessile, in a ring at the base of a roundish, oblong, downy, 3–4-lobed ovary. Stigmas 3–4, large, fleshy, reflexed. Fruit. . . .

Upper Guinea. Gaboon river, river Kongui, and Ambas Bay, *Mann !*

The specimens from Ambas Bay have nearly sessile leaves and smaller flowers than the

others. I cannot look on this as of specific importance, as in some of the other specimens both sessile and stalked leaves may be found, and also considerable difference in the shape of the leaves on the same specimen.

The size of the flowers is also notoriously variable in this genus.

3. **C. laurifolia,** *Mast.* A small tree; the younger branches angular, and, as well as the petioles, covered with ferruginous tomentum. Leafstalks 4–5 in. long, spreading, thickened at the extremity. Leaves 6–8 in. long, leathery, elliptic-lanceolate, tapering at the base, acuminate at the apex, crisped or sinuous, 1-costate, smooth above and with a slight covering of rusty tomentum along the nerves on the under surface. Panicles cymose, axillary, many flowered, much shorter than the leafstalks. Pedicels slender, ½ in. long, like the calyx, very densely covered with dark reddish-brown stelliform tomentum. Flower-buds globose. Flowers small, not ⅓ in. in diam. Calyx broadly campanulate, deeply 5-parted; segments ultimately spreading, oblong-lanceolate. Male fl.: Column slender, cylindrical, as long as or longer than the calyx-lobes. Anthers 10, in a single row at the top of the column; anther-lobes parallel. Female fl.: Fruiting branches thickened. Fruits of 2–3–5 subsessile, spreading, oblong, obtuse or roundish carpels, each carpel coriaceous (rugose when dry), slightly fleshy in the fresh state, indehiscent, 1–2 inches long, ¾–1 in. wide. Seeds 4–6 in each carpel, oblong, obtuse, subtetragonal; testa yellow, cartilaginous; albumen 0. Cotyledons 2, flat, brownish, thick; radicle directed towards the hilum.

Upper Guinea. Nupe, *Barter!* ? Quorra, *T. Vogel.*

Apparently a very distinct species, recognizable by its long-stalked undulate leaves, its small flowers and peculiar fruit and seeds. It is a true *Cola.* Very like it, if not identical, is a specimen of Vogel's from the Quorra, and labelled by Planchon as "sp. n. *C. Vogelii.*"

It differs from the plant just described in its much broader nearly glabrous leaves, and in its apparently more woody fruit. The materials are too imperfect to allow of my adopting Planchon's indications.

4. **C. gabonensis,** *Mast.* A shrub, the younger branches slender, covered with reddish wrinkled branches. Stipules linear-lanceolate, downy, ¼–½ in. long. Petioles cylindrical, glabrous, 2–4 in. long. Leaves subcoriaceous, elliptical, acuminate, entire, tapering at the base, 1-costate, glabrous, arcuate-venose. Flowers few, on short axillary stalks, ¼–½ in. long. Flower-buds subglobose, downy. Calyx of male flower funnel-shaped, 5-toothed, teeth connivent, deltoid. Column slender, shorter than the perianth. Anthers 1-seriate, 2-lobed; lobes parallel, in a ring at the apex of the column. Hermaphrodite fl.: Immature fruit of 4 small, oblong, downy, wrinkled, woody, spreading carpels. Seeds . . .

Upper Guinea. Gaboon river, *Mann!*

Seemingly distinct from any other species, but the materials are as yet very imperfect.

5. **C. clavata,** *Mast.* A tree of considerable size (*Kirk*), covered with greyish ash-coloured bark. Stipules . . . Petioles slender, cylindrical, 2–3 in. long, thickened at the apex. Leaves as long as or longer than the petioles, 1½–2 in. wide, subcoriaceous, glabrous, oblong obtuse, or elliptical, tapering at the base, entire or undulate at the margins, 1-costate, arcuate-venose. Flowers

. . . Fruiting-pedicels solitary or 3–4 from the axils of the fallen leaves, ½–¾ in. long. Carpels 2 by abortion, 1–1½ in. long, oblong, tapering at the base and slightly curved, indehiscent, 1-celled, 1-seeded. Seed oblong; testa yellow, shining, membranous; tegmen fibrous; albumen 0. Cotyledons 2, flat, thick; radicle directed towards the hilum.

Mozamb. Distr. Shamo, *Drs. Meller! and Kirk!*

Fruiting specimens only exist in the herbarium, but these are so distinct as to warrant the formation of a new species. The club-shaped 1-seeded fruits seem very characteristic.

6. **C. ficifolia,** *Mast.* A small tree, 20 ft. high. Branches covered with rufous stellate tomentum. Stipules nearly an inch in length, linear-lanceolate, longitudinally striate, persistent. Leafstalks 12–18 in. long, cylindrical. Leaves 18–24 in. long, somewhat less in breadth, rigid, leathery, cordate, roundish, palmately 3–5-lobed; lobes oblong, obtuse or abruptly acuminate, undulate, smooth on both surfaces, with prominent reticulate venation below. Flowers numerous, subsessile, in dense axillary tufts; bractlets spoon-shaped, downy. Flower-buds subglobose. Calyx campanulate, downy, 5-cleft; segments deltoid, crimson and longitudinally striated on the inner surface. Male fl. . . . Female fl.: Anthers nearly sessile, 2-lobed; lobes parallel, surrounding a 3-lobed, 3-celled, downy ovary, surmounted by 3 fleshy reflexed stigmas. Fruit. . . .

Upper Guinea. Fernando Po, *Mann!*

The leaves are strikingly like those of *Ficus Carica*, hence the name.

7. **C. heterophylla,** *Mast.* A tree with greyish rugose bark. Leaves on long stalks; petioles thickened at the apex; blades membranous, covered when young with rufous down, ultimately glabrous, polymorphous, usually wedge-shaped at the base and more or less palmately 3-lobed; lobes oblong-lanceolate acuminate; central one largest, rarely quite entire, oblong, roundish at the base. Flowers numerous, in axillary or terminal cymose panicles. Peduncles shorter than the petioles. Calyx ¼ in. in length, leathery, funnel-shaped, downy outside; limb 5-parted; lobes ovate acute, reddish within. Male fl.: Anthers 10, 2-celled; lobes parallel, in a ring on the end of a slender column, shorter than the calyx. Female fl. . . .—*Sterculia heterophylla*, Beauv. Fl. Owar. t. 40. *Courtenia heterophylla*, R. Br. Pl. Jav. Rar. 230. *C. triloba*, R. Br. l. c.

Upper Guinea. Senegambia, *Heudelot!* Niger, *Barter!*

There is little or no doubt that R. Brown's *Courtenia triloba* belongs to this species, the main difference being in the shorter peduncles of the latter plant, a character of little importance.

8. **C. Afzelii,** *Mast.* A small tree, 30 feet high; the younger branches, petioles, and nerves of the leaves covered with bristly hairs. Leafstalks 2–4 in. long. Leaves 4–5 in. long, cordate, roundish, palmately 5–7-lobed; lobes narrowed at the base, obovate, acuminate, sinuous or entire. Flowers crowded, in short terminal clusters; pedicels ½ in. long, covered with reddish down. Calyx funnel-shaped, leathery, downy outside, purplish within; limb 4- or 5-cleft; lobes ovate, acute, spreading. Male fl.: Staminal column cylindrical, smooth, shorter than the calyx, surmounted by a ring of ten 2-

lobed anthers; lobes parallel, often surrounding an imperfect ovary. Female fl.: Ovary oblong, downy, 10-celled (?), surmounted by 10 reflexed styles. Follicles thick, 2 in. long, numerous. Seeds with a fibrous testa. Cotyledons 2.—*Courtenia Afzelii*, R. Br. Pl. Jav. Rar. 236. *Sterculia caricæfolia*, Don, Gen. Syst. i. 517.

Upper Guinea. Sierra Leone, *Afzelius!* Niger, *Barter!*
Lower Guinea. Congo, *Smith!*

The only female flower (from a living plant at Kew) I have been able to examine was not in a state to enable me to ascertain with certainty the number of cells in the ovary, though the number of styles was evidently 10.

9. **C. quinqueloba,** *Garcke in Pet. Mossamb. Bot.* i. 130. A tree, 70 ft. in height, with a yellow bark (*Kirk*). Petioles 8–10 in. long, canaliculate. Leaves roundish, subcoriaceous, glabrous, 8–9 in. long, cordate, palmately 3-7-lobed; lobes rounded or acuminate, entire or undulate. Inflorescence terminal, much branched, paniculate. Flowers small, villose. Calyx 5-fid. Carpels 3–5, on a short stalk, oblong, acute, curved, coriaceous or woody, more or less coherent, covered with dense rust-coloured tomentum, 1-celled, downy in the interior. Ovules or young seeds numerous, attached to the inner angle of each carpel.

Mozamb. Distr. Zambesi, *Dr. Kirk!* Mozambique, Macanga, *Peters.*

Dr. Kirk's specimens have only leaves and immature fruit; there is, however, little doubt as to their identity with Garcke's plant.

10. **C. argentea,** *Mast.* A small tree, 15 ft. high (*Mann*). Leafstalks 12–18 in. long, terete, more or less covered with rust-coloured stellate tomentum. Stipules linear-lanceolate, persistent. Leaves digitate, of 5–9 sessile, oblong, acuminate leaflets, as long as or longer than the common petiole, 5–6 in. across, entire or irregularly pinnately lobed; outermost lateral leaflets inequilateral, all smooth above, silvery-white beneath, with prominent reticulated nerves, covered with reddish-brown villi. Flowers numerous, produced from the old wood. Pedicels very short, 2–3-bracteolate. Calyx ½ in. long, campanulate, leathery, downy on the outside, crimson within and marked with small tubercles and striæ; limb 5-cleft; segments ovate, acute. Male fl.: Staminal column slender, cylindrical, scarcely so long as the calyx, terminated by a ring of 10 anthers, each with 2 parallel lobes, and concealing the rudiments of a 3-carpellary pistil. Female fl.: Anthers subsessile round the base of a 3-lobed, 3-celled, downy ovary, surmounted by 3 large, reflexed, red, fleshy stigmas. Ovules numerous. Fruit. . . .

Upper Guinea. Lat. 1° N., *Mann!*

This is remarkable for the beauty of its foliage as well as for its 3-carpellary ovary. It would be desirable to introduce this as an ornamental stove-plant.

11. **C. digitata,** *Mast.* A small tree, 12–15 ft. high (*Mann*), with stout cylindrical branches. Leafstalks spreading more or less horizontally, 12–18 in. long, cylindrical; blades digitate with 7–9 leaflets each, as long as or longer than the common stalk, subcoriaceous, glabrous, elliptical, acuminate, tapering at the base and slightly decurrent along the sides of a secondary stalk, 2–3 in. in length, entire or irregularly pinnately cleft, especially the

central leaflet; lobes acuminate. Flowers in short dense clusters, emerging from the branch a little above the axil of a leaf. Pedicels ½ in. long, covered with close reddish down. Flower-buds globose or somewhat tetragonal. Calyx campanulate, coriaceous, of 5 roundish, valvate lobes, striate in the interior. Male fl. . . . Hermaphrodite fl.: Anthers numerous, each with 2 linear parallel lobes, irregular in size and disposed in a ring around the base of 5 short, downy, 1-celled carpels, each surmounted by a large, fleshy, rounded stigma. Fruiting pedicels thickened, 1 in. in length. Ripe carpels 2 by abortion, 2–3 in. long, oblong-acuminate, ventricose, tapering at the base into a stalk scarcely shorter than itself, splitting widely along the placental or ventral suture so as ultimately to be nearly flat, and thus expose the brilliant crimson inner surface. Seeds 4–6 in each carpel, oblong, obtuse, somewhat compressed, ½ in. long; testa black, shining, parchment-like (when dry). Albumen 0. Cotyledons 2, thick, flat, brownish; radicle directed towards the hilum.

Upper Guinea. Prince's Island, *Barter! Mann!* West Africa, *Captain Babington!*

The splendid foliage and brilliant crimson of the expanded fruit render this a very desirable plant for introduction. In the early dehiscence of the fruit it resembles the species of the section *Firmiana*, but the present plant has thick, coriaceous, almost woody follicles.

4. HERITIERA, Dryand. (v. Aiton?); Benth. et Hook. f. Gen. Pl. i. 219.

Flowers unisexual. Calyx 5-toothed or 5-cleft. Petals 0. Column slender, bearing 5 anthers in a ring, just below the apex of the column. Anther-cells parallel. Ovary 5-celled. Style short. Stigmas 5, thick. Ripe carpels woody, indehiscent, with a prominent keel along the back. Seed exalbuminous. Cotyledons very thick; radicle next the hilum.—A tree, with leathery entire leaves, shining on the under surface; venation penninerved. Flowers small in axillary panicles.

There are but two species of this genus, both widely distributed along the coasts of tropical Asia and Australia. One species alone has yet been found in Africa.

1. **H. littoralis,** *Dryand. in Hortus Kewensis, ed.* 1. iii. 546. A moderate-sized tree. Leaves with caducous lanceolate stipules. Petioles 1–1½ in. long, covered with flat scales. Leaves 3–5 in. long, 2–3 in. wide, subcordate, oblong, acute, coriaceous, silvery-white on the under surface and with a few flat scales. Male flowers small, in axillary much-branched clusters, shorter than the leaves. Calyx urceolate, downy, divided above into 5 shallow oblong teeth. Column short. Anthers 5. Female flowers larger than the males. Calyx bell-shaped. Follicles 1 to 4, from 1 in. and upwards in length, woody, oblong, keeled, 1-seeded.

Mozamb. Distr. Mouths of the Zambesi, *Dr. Kirk!* Tette, *Dr. Kirk!*

Not previously recorded from the African coast, but widely diffused along the seacoasts of tropical Asia, the islands of the Pacific, etc.

5. KLEINHOVIA, Linn.; Benth. et Hook. f. i. 219.

Bractlets small. Sepals 5, deciduous. Petals unequal; the upper ones

with a long stalk; margins involute at the base. Column elongate, adherent to the gynophore, expanding above into a bell-shaped cup, which is divided into 5 subdivisions, each bearing 3 anthers; anther-cells divergent. Ovary stalked, concealed within the cup of the anthers, 5-lobed, 5-celled, with 3–4 ovules in each cell. Style slender. Capsule pyriform, membranous, distended, 5-lobed, loculicidally 5-valved. Seeds 1 or 2 in each cell, globose, tubercled, exalbuminous. Cotyledons spirally twisted; radicle next the hilum.—A tree with entire leaves and rosy flowers, in loose panicles.

*1. **K. Hospita,** *Linn.; DC. Prod.* i. 488. A tree. Petioles about 1 in. long. Leaves cordate, ovate, subacuminate, entire, palmately 3–5-ribbed, smooth, 2–4 in. long, 2–3 in. wide. Flowers purplish, numerous, arranged in much-branched, spreading cymes; pedicels downy, jointed. Calyx 5-parted; segments revolute. Petals 5, tubular, unequal in size. Column curved, dilated above into a campanulate cup, which divides into 5 phalanges of 3 stamens each without any intermediate staminode. Fruit pyriform, bladdery, 5-lobed, 5-winged. Seeds 2 or 3 in each cell, roundish, tuberculate.

Mohilla isles, *Dr. Kirk!* not hitherto found on the mainland, but as it would seem probable that it may be met with it is here inserted.

A common Indian tree.

6. DOMBEYA, Cav.; Benth. et Hook. f. Gen. Pl. i. 221.

Bractlets 3, unilateral, caducous. Calyx 5-parted, ultimately reflexed. Petals 5, oblique, imbricate, flat, dry, marcescent. Filaments combined below into a shallow cup, divided above into 5 staminodes and 10–15 perfect stamens, alternating with the barren ones. Anther-cells extrorse, parallel. Ovary sessile, 2–5-celled. Ovules 2–3 in each cell. Style filiform. Stigmas 5. Capsule loculicidal. Seeds ascending, 1–2 in each cell of the fruit, albuminous. Cotyledons 2-parted; radicle directed towards the hilum. —Shrubs, with cordate palminerved leaves. Flowers numerous, arranged in much-branched, axillary or terminal cymes, often remaining on the branches after the leaves have fallen.—*Xeropetalum*, Delile, Voy. Meröe, 84. *Astrapæa*, Lindl. Coll. Bot. 14.

The species of this genus are almost exclusively African.

Flowers produced on leafless stems (*Xeropetalum*) . . . . . 1. *D. multiflora.*
Flowers produced with the leaves.
  Stamens united at or close to the base only.
    Peduncles slender, villose, shorter than the adjoining leaves. Sepals oblong-lanceolate.
      Leaves orbicular or oblong, acute . . . . . 2. *D. spectabilis.*
      Leaves ovate-acuminate, obscurely 3-lobed . . . . . 3. *D. Kirkii.*
    Peduncles glabrous, longer than the adjacent leaves. Sepals ovate, acute . . . . . 4. *D. reticulata.*
  Stamens coherent at the base for nearly half their length so as to conceal the ovary.
    Leaves palmately lobed, rufously downy. Flowers very large . . 5. *D. Burgessiæ.*
    Leaves cordate, scarcely lobed.
      Sepals rarely half the length of the corolla.
        Leaves downy and villose. . . . . 6. *D. Mastersii.*

Sepals nearly equalling the corolla.
Inflorescence shorter than the petiole. Peduncles villose . 7. *D. Schimperiana.*
Inflorescence as long as or longer than the petiole. Peduncles glabrous . . . . . 8. *D. Bruceana.*

1. **D. multiflora,** *Planch. in Fl. des Serres, t.* 6, 225. *tab.* 605. A shrub, with glabrous or downy branches. Petioles 1–2 in. long. Leaves 1–2 in. long, cordate-roundish or oblong, irregularly toothed, palmately 5–7-nerved, stellate-pilose on both surfaces, downy when young, nearly glabrous when old. Inflorescence appearing before the leaves from the axils of the fallen leaves; cymes stalked; pedicels numerous, as long as the petioles. Bracts small, linear, caducous. Sepals lanceolate, downy or sometimes quite glabrous. Petals exceeding the sepals, oblique, cuneate, erose. Stamens shortly monadelphous. Ovary roundish, villose, Style divided nearly to the base into 5 divisions.—*Xeropetalum multiflorum,* Endl. Stirp. Nov. n. 43, ex Walp. Rep. i. 349. *X. minus,* Endl. l. c. n. 44. *Dombeya senegalensis,* Planch. in Fl. des Serres l. c. *? Xeropetalum quinquesetum,* Delile, Voy. Meröe, 85.

Upper Guinea. Senegambia, *Heudelot!*
Nile Land. Sennar, *Kotschy!* Madi, *Speke and Grant!* White Nile, *Petherick!*
Mozamb. Distr. Manganya hills, *Dr. Meller!*

There are so many gradations between the forms above enumerated that it seems best to unite them. *X. minus* has smaller flowers and partially pilose calyx. *D. senegalensis* has slightly larger flowers than the preceding, and the calyx is covered with appressed hairs. The typical *D. multiflora* has the largest flowers of all, and entirely glabrous calyces. The amount of pubescence depends much on age, and is of no value as furnishing specific characters.

2. **D. spectabilis,** *Bojer in Ann. Sc. Nat. Ser.* 2. 18. 190. A small tree. Petioles downy, 3–4 in. long. Leaves cordate, orbicular or oblong, acute, undulate, palmately 5–9-nerved, rough on the upper surface, covered with rusty or sometimes whitish pubescence on the lower surface. Cymes axillary and terminal, much branched, many-flowered. Bracts minute, linear, deciduous. Flowers ¾ in. across. Sepals lanceolate, shorter than the corolla. Petals white, roundish, inæquilateral. Stamens united at the base only. Ovary roundish, villose.

Mozamb. Distr. Zanzibar, *Burton!* Manganya hills, *Dr. Meller!*

The African specimens do not materially differ from those from Madagascar, which were the first described.

3. **D. Kirkii,** *Mast.* A shrub or small tree; the younger shoots, petioles, leaves, and calyces covered with dense stelliform tomentum. Petioles 2–3 in. long. Leaves cordate-ovate, acuminate, often more or less 3-lobed. Lobes acute or acuminate, coarsely and irregularly crenate-serrate. Peduncles axillary and terminal, longer than the leafstalks; pedicels slender, 1–2 in. long with spreading villi. Bractlets 3 linear-oblong, obtuse, shorter than the calyx, caducous. Flower-buds subglobose. Flowers less than ½ in. in diam., white. Sepals oblong-lanceolate. Petals obliquely cuneate, retuse, double the length of the calyx. Filaments free nearly to the base. Ovary downy. Stigmas 2–5 included.

Mozamb. Distr. Lat. 16° S., *Dr. Meller!* Lupata, *Dr. Kirk!*

The specimens differ from *D. viburniflora*, Bojer, a native of Comoro, Madagascar, etc., in their smaller leaves and flowers, looser inflorescence, and shorter broader petals. Possibly it may be merely a form of that species.

4. **D. reticulata,** *Mast.* A shrub, the herbaceous portions subglabrous. Leafstalks 1–4 in. long, shorter than the leaves, which latter are 2–8 in. long, 2–6 in. wide, cordate-ovate, acute or obscurely lobed, rough with short stellate tomentum on both surfaces, palmately 5–7-nerved; veins very prominent on the lower surface. Peduncles longer than the adjacent leaves, smooth, dividing at the summit in 2–3- or 4-furcate cymes; ultimate pedicels shorter than the flowers, covered, like the calyx, with stellate tomentum. Bractlets linear. Flower-buds roundish or ovate acute, downy. Flowers ½ in. across. Sepals ovate-lanceolate, half the length of the corolla. Petals broad. Stamens united near the base.

Nile Land, *Speke and Grant!*
The prominent nerves render this species easy of discrimination.

5. **D. Burgessiæ,** *Gerr.; Harv. et Sond. Fl. Cap.* ii. 590. A much-branched shrub, densely covered in all its herbaceous portions with soft ferruginous or pale velvety hairs. Petioles 3–4 in. long, shorter than the blades. Leaves roundish or angular, deeply cordate, palmately 5–7-lobed; lobes ovate, acuminate, irregularly toothed. Stipules lanceolate. Cymes much branched, many-flowered, axillary and terminal, erect, larger than the adjacent leaves. Bracts 3, ovate-lanceolate, half the length of the sepals. Flower 1½ in. across; sepals lanceolate, smooth, scarcely so long as the white, obovate, oblique petals. Stamens united near the base. Capsule ovoid, obtuse, densely villose.—Bot. Mag. 5487.

Mozamb. Distr. Lat. 14–19° S., *Dr. Kirk!* Manganya hills, *Dr. Meller!*
This handsome species, originally found in Natal, varies in the amount of its pubescence; the flowers are white, pencilled with rose.

6. **D. Mastersii,** *Hook. Bot. Mag. t.* 5639. A small tree, the herbaceous portions tomentose and with weak spreading villi. Petioles 1–3 in. long. Leaves cordate-ovate, acute or acuminate, sometimes obscurely lobed, palmately 5–9-nerved. Peduncles axillary and terminal, about the length of the petioles, bearing a many-flowered umbel; pedicels slender, shorter than the peduncles. Bracts linear-oblong, caducous, nearly as long as the calyx. Flower-buds ovoid, acute. Sepals lanceolate, ⅓ in. long, shorter than the broad, oblique, obovate-cuneate, whitish petals. Stamens united at the base for rather less than half their length. Style pilose at the base, longer than the stamens. Stigmas included. Ovary very downy.

Upper Guinea. Abbeokuta, *Irving!*
Nile Land. Abyssinia, *Roth!* Chopch, *Grant!*
This plant was erroneously described in the 'Gardeners' Chronicle,' 1867, 14, as *D. angulata*, Cav. It is much more like *D. tomentosa*, Cav. Diss. iii. t. 39, a species from Madagascar, of which, however, there are no authentic specimens at Kew. Cavanilles' figure represents a form with smaller flowers than the present, and with a central, solitary, pedicellate flower in the fork of the diverging peduncles, an arrangement not found in any specimen of the genus yet examined by me.

7. **D. Schimperiana,** *Rich. Fl. Abyss.* i. 78. A tall tree. Leafstalks 3–5 in. long, covered with rufous spreading villi, as are also the disk and the prominent nerves of the leaf; blades 4–6 in. long, 3–4 in. wide, cordate, oblong, acuminate, dentate, palmately 5–9-nerved, downy on both surfaces. Stipules lanceolate, acuminate. Peduncles terminal and axillary, 1–2 in. long, much shorter than the petioles; pedicels numerous, umbellate, nearly as long as the peduncles. Bracts oval or oblong, acute, caducous. Flower-buds oblong-ovoid. Flowers large. Sepals lanceolate, reflexed. Petals longer than the sepals, broadly obovate, oblique, tapering at the base. Stamens united at the base for less than half their length. Style hairy at the base; stigmas included.—*Xeropetalum hirsutum,* Hochst. Pl. Schimp. Abyss.

Nile Land. Abyssinia, *Schimper!*

A handsome species with large leaves, the disk of which at the junction with the petiole is marked with a patch of rufous hairs.

8. **D. Bruceana,** *Rich. Fl. Abyss.* i. 77. A tree with glabrous shoots. Petioles 1–3 in. long, glabrous, shorter than the leaves, which are cordate, oblong, acuminate, dentate, palmately 5–7-nerved, scabrous above, stellate-tomentose below, 2–4 in. long, 2–3 in. wide. Stipules lanceolate, caducous. Peduncles axillary and terminal, downy, as long as the petioles, simple or 2-fid, bearing a number of slender umbellate pedicels half the length of the peduncles. Bracts 3, ovate-lanceolate, caducous. Sepals downy, lanceolate, nearly as long as the broad oblique petals. Stamens united for rather less than half their length. Style hairy; stigmas 5, revolute, often exserted. Capsule oblong, depressed, villose, loculicidally 3-valved; valves obtuse.—"*Walkuffa,*" Bruce, Voy. tab. 20. *Xeropetalum Brucei,* Hochst. in Pl. Schimp. Abyss.

Nile Land. Abyssinia, *Schimper!*

7. **MELHANIA,** Forst.; Benth. et Hook. f. Gen. Pl. i. 222.

Bractlets of epicalyx 3, persistent, unilateral. Sepals 5. Petals 5, convolute, marcescent. Fertile stamens 5, alternating with an equal number of staminodes, all combined below into a shallow cup. Anthers extrorse, cells parallel; connective thick. Ovary sessile, 5-celled; cells with 1 or many ovules. Style short, dividing above into 5 liguliform stigmatic branches. Capsule loculicidal. Seeds albuminous. Cotyledons folded, 2-parted; radicle inferior.—Herbs or undershrubs covered more or less densely with stelliform tomentum. Leaves ovate or roundish. Peduncles simple or cymose, remote or crowded at the ends of the branches. Bractlets broad or narrow, so arranged that the odd one is farthest from the axis, the two lateral ones having usually the edges that are next the axis turned outwards. Flowers yellow. Petals rarely unfolding and only for a short time.

The species of the genus are distributed in the warmer parts of Africa, Asia, and Australia. The African species have most in common with the Indian ones.

Seeds 1 or 2 in each cell of the capsule. Bracts reniform . . . . 1. *M. bracteosa.*
Seeds more than 2 in each cell of the capsule. Bracts not reniform.

Leaves roundish.
Pedicels 1-flowered, not much longer than the petiole . . . . 2. *M. cyclophylla.*
Pedicels 2–3-flowered, nearly double the length of the petiole . 3. *M. rotundata.*
Leaves oblong.
Bracts abruptly acuminate.
Peduncle half as long as the adjacent leaf. Sepals villose . . 4. *M. ferruginea.*
Peduncle nearly as long as the leaf. Sepals not villose . . . 5. *M. acuminata.*
Bracts tapering, acute.
Bracts broad . . . . . 6. *M. Forbesii.*
Bracts linear . . . . . 7. *M. ovata.*

1. **M. Denhami,** *R. Br. in Denh. et Clapp. Voy. App.* 233. Stock woody, dividing into a large number of crowded, spreading, downy, somewhat compressed branches. Leafstalks 1 in. long, about the length of the leaves, which are ovate-oblong obtuse or acute, crenate-serrate, velvety on both surfaces. Peduncle longer than the leaf to which it is axillary, dividing above into 2, rarely 3 short pedicels. Epicalyx of 3 broad, reniform, accrescent, ultimately membranous bracts, concealing the calyx, whose sepals are ovate, acute. Corolla red. Capsule about the size of the calyx, subglobose, villose, 5-celled, with 1 or 2 smooth seeds in each cell.—*Brotera bracteosa,* Guill. et Perr. Fl. Seneg. i. 80. t. 17. *Melhania Kotschyi,* Hochst. Pl. Nub. Kotschy. *Cardiostegia Kotschyi,* Presl, Epimel. Bot. 249.

Upper Guinea. Senegambia, *Perrottet!*
Nile Land. Kordofan, *Kotschy!*
Mozamb. Distr. Senna, *Peters.*

A singular species having much the appearance of *Senra incana.* The same species occurs in Arabia, Scinde, etc. It varies in the size of its parts and also in the number of seeds in each cell of the capsule.

2. **M. cyclophylla,** *Hochst. Pl. Schimp. Abyss.* Stock thick, woody, dividing above into a number of subcæspitose erect or spreading branches, sparsely covered with stelliform tomentum. Stipules setaceous, brown, deciduous. Leafstalks 1 in. long, rather shorter than the roundish crenate-dentate leaves, which are palmately 3–5-costate and slightly downy on both surfaces. Peduncles solitary, axillary, 1-flowered, as long as the adjacent leafstalks. Epicalyx of 3 lanceolate bracts, shorter than the lanceolate, acuminate sepals. Corolla when expanded an inch across. Capsule villose, shorter than the calyx. Seeds smooth.

Nile Land. Abyssinia, *Schimper!*

3. **M. rotundata,** *Hochst. Pl. Schimp. Abyss.* Suffruticose, erect, the older portions sparingly covered with stelliform pubescence, the younger parts more densely so. Branches somewhat compressed above. Leafstalks flattish, 1–2 in. long, as long as or longer than the blades, which are cordate, roundish or ovate, coarsely crenate-dentate, palmately 3–5-costate, tomentose on both surfaces. Peduncles longer than the leafstalks, solitary, axillary, dividing near the top into a 3-furcate cyme. Epicalyx of 3 lanceolate, very acute, often reflexed segments, ½ in. long, as long as the sepals, which are erect, lanceolate, with very long points, unicostate. Capsule cylindrical, oblong, villose, shorter than the calyx. Seeds tuberculate.

Nile Land. Abyssinia, *Schimper!*

4. **M. ferruginea,** *Rich. Fl. Abyss.* i. 76. An erect, much-branched undershrub, 2–3 ft. in height, covered in all parts with a more or less dense covering of grey down and stelliform hair. Stipules setaceous, persistent, ¼–½ in. long. Leafstalks 1–1½ in. long, shorter than the blades, which are subcordate oval-oblong, obtuse or slightly acute, serrate, velvety on both surfaces, palmately 3–5-costate; nerves covered below with rufous tomentum. Peduncles longer than the leafstalks, solitary, axillary, clustered at the ends of the branches, simple or di-trichotomous. Epicalyx one-sided, of 3 broadly ovate, acuminate segments, rather shorter than the calyx. Sepals 5, lanceolate, acuminate, erect, ¾ in. long. Petals convolute. Fruit ovoid, pointed, villose, 5-celled, shorter than the calyx. Seeds 10 in each cell, subquadrate, cuneate, tuberculate.

Nile Land. Abyssinia, *Schimper!* Madi, *Speke and Grant!*

5. **M. acuminata,** *Mast.* Suffruticose, erect, 2–3 ft. in height, branched, covered in the herbaceous portions with greyish stelliform tomentum. Petiole ½–¾ in. long. Stipules linear-subulate, persistent, scarcely shorter than the petioles. Leaves oblong acute or oval, serrate, palmately 2–3-costate, 2–4 in. long, two or three times longer than the stalks. Peduncles solitary, axillary, nearly as long as or longer than the adjacent leaves, remote or crowded at the ends of the branches, bearing near the summit a trichotomous cyme. Pedicels short. Epicalyx of 3 cordate, abruptly acuminate bracts shorter than the calyx, acumen very long. Flowers of moderate size. Sepals lanceolate, exceeding the ovoid, pointed, villose capsule. Seeds rugose.

Mozamb. Distr. Senna, *Dr. Kirk!*

6. **M. Forbesii,** *Planch. mss. in Herb. Kew.* Stem suffruticose, erect, 2 ft. high, slightly branched, smooth below, thickly covered with ferruginous down on all the herbaceous portions. Petioles about an inch long, downy. Stipules setaceous, nearly as long as the petioles; blades 3–4 in. long, 2 in. broad, oblong, obtuse, serrate, palmately 3-costate; nerves covered with rust-coloured down especially on the lower surface. Peduncles axillary, lower ones remote, 2–3 in. long, dividing above into 3 branches, upper ones shorter, crowded at the end of the branches. Epicalyx of 3 broadly ovate, acute, scarcely acuminate segments, as long as the downy lanceolate sepals. Petals deep yellow, convolute. Capsule oblong, obtuse, villose, shorter than the calyx. Seeds rugose or subglabrous.

Mozamb. Distr. Shupanga, *Dr. Kirk!* Mozambique, *Hutton!*
The same species occurs in Madagascar, Natal, etc. It resembles *M. ferruginea* in habit, but has longer, more branched peduncles, less acuminated bracts, and smoother seeds.

7. **M. abyssinica,** *Rich. Fl. Abyss.* i. 76. *t.* 18. Stock woody, tortuous, dividing above into a number of crowded, subcæspitose, erect branches, the latter covered with greyish down. Leafstalks less than an inch long, shorter than the subcordate, oval, obtuse, crenate-dentate leaves, which are unicostate, downy on both surfaces, paler beneath. Stipules linear, hair-like.

Peduncles axillary, equal to or exceeding the petioles, simple or bifurcate. Buds oblong, cylindrical. Flowers when expanded ¾ in. across. Epicalyx 1-sided, of 3 linear-subulate bracts, as long or nearly so as the ovate-lanceolate, downy sepals. Petals yellow, convolute. Capsule roundish or slightly pointed, villose, as long as the ripe fruit. Seeds punctate, tuberculate.—*Brotera ovata*, Cav. Ic. v. 20. t. 433. *B. Leprieurii*, Guill. et Perr. Fl. Seneg. i. 85. *M. oblongata*, Hochst. Pl. Schimp. Abyss. *M. Leprieurii*, Webb, Fl. Nigrit. 110. t. 4, 5.

Nile Land. Abyssinia, *Schimper! Dillon and Petit! Roth!*

The same species occurs at the Cape de Verde Islands, also in Scinde. I have here combined two or three reputed species, being unable to find any constant or material differences between them.

8. HERMANNIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 233.

Calyx 5-cleft. Petals 5, obovate or oblong, marcescent or deciduous. Stamens 5, opposite to the petals, connate at the base. Staminodes 0. Filaments oblong or dilated towards the summit. Anther-cells parallel. Ovary sessile or shortly stalked, 5-celled. Ovules many in each cell. Styles 5, more or less united. Capsule loculicidally 5-valved; apex often with horny appendages. Seeds reniform, albuminous; embryo curved; radicle next the hilum.—Herbs or undershrubs generally more or less covered with stellate tomentum. Leaves dentate or cut. Stipules foliaceous or 0. Peduncles axillary or in terminal clusters, 1-flowered. Flowers yellow or red.

An extensive genus, the majority of the species being natives of the Cape of Good Hope; a very few are found in Mexico and Texas.

Leaves linear, obtuse.
- Stem annual . . . . . 1. *H. modesta.*
- Stem woody . . . . . 2. *H. filipes.*

Leaves oblong, acute.
- Capsule obtuse, sessile or shortly stipitate. Stipules as long as or longer than the petiole . . . . . 3. *H. tigrensis.*
- Capsule tapering at the base into a stalk, shorter than the petiole. Stipules narrow . . . . . 4. *H. Kirkii.*

1. **H. modesta,** *Planch. in Ann. Sc. Nat. Ser.* 4. iii. 292. A low-growing slender annual, covered with glandular hairs. Leaves subsessile, linear-oblong, entire, 1–1½ in. long, covered with a few stellate hairs. Stipules subulate. Peduncles solitary, axillary, filiform, scarcely so long as the leaf; flowers nodding, about ½ in. long. Calyx bell-shaped, 5-cleft; lobes lanceolate, acuminate, glabrous. Filaments dilated above; anthers linear. Styles 5, shorter than the stamens. Capsule . . .—*Trichanthera modesta*, Schreb. in Linnæa, iv. 401.

Nile Land. Nubia, *Kotschy!* Soturba, *Schweinfurth!*

The same species also occurs in Arabia, whence the first specimens were derived, and were referred to a distinct genus, which however, Planchon properly includes under *Hermannia.*

2. **H. filipes,** *Harv. in Harv. et Sond. Fl. Cap.* i. 206. Stem woody, erect, 1–3 ft. high, much branched. Branches ascending, slender, covered with a few, scattered, simple or glandular-viscid hairs. Leaves scarcely 1 in.

long, on very short stalks, linear-oblong, obtuse, dentate, revolute at their margins, covered with stellate hairs. Stipules subulate. Peduncles filiform, solitary, axillary, 1-flowered, as long as or longer than the adjacent leaves, jointed near the top and remaining after the flower, sometimes even after the floral leaf has fallen. Calyx bell-shaped, 5-lobed; lobes triangular acuminate, nervation prominent. Petals pink. Filaments petaloid, oblong, as long as the pointed 2-fid anther. Capsule oblong, truncate, longer than the persistent calyx, loculicidally 5-valved; valves oblong, truncate, hispid at the margins and provided with two short horns at the upper angles.

Lower Guinea. Benguela, *Dr. Curror!*

Occurs also in Natal. Planchon recognized the Benguelan plant as a distinct species, and affixed to it, in the Hookerian herbarium, the same name that Harvey subsequently published. Dr. Harvey's plant is described as having entire leaves, but in the Benguelan specimen most of the leaves are dentate, while others appear to be entire from the margin being revolute. As the agreement in all other points appears to be so close, I have not hesitated to consider the Zooloo and the Benguelan plants as belonging to the same species in spite of the widely different localities.

3. **H. tigrensis,** *Hochst. in Rich. Fl. Abyss.* i. 74. *t.* 17. An annual, with an erect branching stem, about 1 ft. in height. Branches ascending, slender, clothed with stellate hairs. Leaves subsessile, elliptic-oblong, acute, 1–1½ in. long, serrate, with simple hairs above, stellate ones on the lower surface. Stipules persistent, falcate, lanceolate, pilose, twice the length of the petioles. Peduncles axillary, solitary, 1-flowered, spreading, generally longer than the leaves, slender, pilose near the top. Filaments petaloid, obovate; anthers 2-fid. Capsule obovoid, somewhat 5-lobed, 5-valved; valves with two horns at the upper angles. Seeds reniform, transversely furrowed.

Nile Land. Abyssinia, *Schimper!*
Mozamb. Distr. Quillimane, *Peters.*

The capsule in this species is very shortly pedicellate or subsessile, and does not taper at the base as in the nearly allied *H. Kirkii.* Its stipules, moreover, are larger and broader than in that species.

4. **H. Kirkii,** *Mast.* An annual, 1–2 ft. high, with erect, hispid, viscid, branches. Leaves stalked; lower petioles nearly 1 in. in length, much exceeding the linear-subulate stipules; upper leaves nearly sessile, oblong-lanceolate, dentate. Leaves stellately pilose, 1–2 in. long, ½–¾ in. wide. Peduncles solitary, axillary, 1-flowered; lower ones shorter, upper ones longer than the leaves, jointed at the top and persistent, covered with a few pilose hairs. Calyx bell-shaped; lobes acuminate, points ultimately reflexed. Corolla pink. Filaments dilated, obovate. Ovary club-shaped, 5-lobed, simply pilose, pedicellate, gradually tapering at the base into a distinct stalk; valves truncate, pilose, 2-horned.

South Central, *Baines!*
Mozamb. Distr. Senna, Tette, Lupata, Zambesi, *Dr. Kirk!* Mozambique, *Peters.*

Nearly allied to *H. tigrensis,* Hochst., but differing in the longer petioles to the lower leaves, much smaller stipules, and longer stipes to the fruit.

9. MAHERNIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 223.

Calyx 5-cleft. Petals 5, obovate or oblong, marcescent or deciduous. Stamens 5, opposite to the petals; staminodia 0; filaments dilated towards the middle or slender all the way up. Anther-lobes parallel. Ovary sessile or stalked, 5-celled. Ovules many in each cell. Styles 5, united at the base. Capsule oblong, loculicidally 5-valved; valves awnless. Seeds reniform. Embryo curved.—Herbs or perennials, having almost exactly the habit of *Hermannia*, but differing from that genus in the inflorescence being terminal or extra-axillary, while the filaments are dilated in the middle or not at all.

Peduncles few-flowered, opposite the leaves . . . . . 1. *M. abyssinica.*
Peduncles in a many-flowered terminal cyme . . . . . 2. *M. exappendiculata.*

1. **M. abyssinica,** *Hochst.; Harv. et Sond. Fl. Cap.* i. 216. A low-growing much branched perennial. Branches filiform, 10–12 in. long, thinly stellate-pubescent. Leaves on short stalks, oblong, obtuse, coarsely toothed. Stipules lanceolate, entire or pinnately lobed. Peduncles shorter than the leaves and opposite to them, dividing at the upper part into two pedicels; bracts entire, oblong-lanceolate, connate below. Calyx bell-shaped, deeply 5-cleft, with hairy ovate acute lobes, shorter than the petals. Capsule oblong, stellate-pubescent, twice the length of the persistent calyx. *Hermannia Quartiniana*, Rich. Fl. Abyss. i. 73.

Nile Land. Abyssinia, *Schimper! Petit!*

The same species occurs in South Africa, the specimens from which region have, however, usually stellate, not simple hairs, on the calyx.

2. **M. exappendiculata,** *Mast.* Perennial, 2–3 ft. high. Branches slender, woody, erecto-patent, purplish, thinly stellate-tomentose. Stipules foliaceous, broad, ovate-lanceolate, ½ in. long, nearly as long as the petiole. Leaves oblong-lanceolate, cordate, coarsely duplicate-serrate, slightly tomentose above, densely covered with greyish tomentum below, 1–3 in. long, ½–1 in. wide. Flowers numerous, in loose, erect, terminal, much-branched cymes, 5–6 in. long. Pedicels clothed with glandular hairs. Calyx campanulate; limb deeply divided into 5 lanceolate acuminate segments, as long as the oblong stalked petals, ultimately deflexed. Filaments linear, uniform, scarcely dilated; anthers extrorse, as long as or longer than the filaments, 2-fid at the apex; edges of the loculi ciliolate. Ovary oblong, obtuse, pilose. Styles 5. Capsule oblong, obtuse, ¾ in. long, longer than the persistent calyx. Seed subreniform or club-shaped, blackish, minutely tuberculate.

Mozamb. Distr. Mombasa, *Bouton!*

Remarkable for its flat exappendiculate filaments.

10. WALTHERIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 224.

Calyx 5-cleft. Petals 5, spathulate, marcescent. Stamens 5, united by their filaments into a tube; anthers 2-celled, cells parallel. Ovary sessile, 1-celled. Style excentric; stigma club-shaped. Capsule 2-valved, 1-seeded.

Seed ascending, albuminous; embryo straight. Cotyledons flat, cordate; radicle next the hilum.—Herbs or undershrubs, more or less densely covered with stellate tomentum. Flowers small, in globose clusters or scorpioidal spikes or branched cymes.

Tropical weeds, varying much in habit, aspect, and stature.

Leaves lanceolate. Petals shorter than the calyx. Bracts and sepals tomentose . . . . . 1. *S. lanceolata.*
Leaves ovate, oblong. Petals longer than the calyx. Bracts and sepals villose . . . . . 2. *S. americana.*

1. **W. lanceolata,** *R. Br. in Herb. Mus. Brit.* An undershrub, densely covered with stellate tomentum. Leaves on very short stalks, lanceolate, crenate-serrate, palmately 3-costate, 1–2 in. long. Stipules linear, as long as the petioles. Cymes axillary, sessile or stalked, scorpioid, shorter than the leaves. Bracts lanceolate, nearly equal to the calyx, which is pyriform, pentangular, 10-ribbed, 5-parted; segments ovate, pointed, densely downy, 3–4-lines long. Corolla shorter than the calyx, of 5 oblong, spathulate, stalked petals, confluent below with the staminal tube, which is shorter than the petals, and bears above 5 2-lobed extrorse anthers, opposite to the petals. Ovary oblong, oblique, setose. Style 1, excentric; stigma curved; ovule ascending. Seed coriaceous.

Upper Guinea. Senegambia, *Heudelot!* Gambia, *Ingram!* Sierra Leone, *Smith!*

This differs from *W. americana*, not only in the form of the leaves, but in that of the calyx, and in the different proportion it bears to the corolla. The present plant, moreover, though downy and pilose, is not villose.

2. **W. americana,** *Linn.; DC. Prod.* i. 492. A perennial plant or undershrub, 1 or 2 ft. high, villose in every part. Leaves shortly stalked, cordate or blunt at the base, ovate-oblong, obtuse, toothed and plicately veined, 1–3 in. long. Flowers small, yellow, in dense heads, almost sessile in the axils of the leaves or the upper ones clustered into a short spike or irregularly collected into dense, leafy or leafless cymes or corymbs. Bracts narrow, villose. Calyx bell-shaped, 5-cleft; segments lanceolate, acuminate, densely villose. Petals longer than the calyx, oblong, tapering to a stalk.—*W. elliptica,* Cav. Diss. vi. 171. *W. indica,* Linn.; DC. Prod. i. 493. *W. guineensis,* Schum. et Thonn. Pl. Guin. 295. *W. africana,* Schum. et Thonn. l. c. *W. pauciflora,* Hochst. Pl. Schimp. Abyss.

Generally distributed throughout tropical Africa.
A common tropical weed, widely distributed and highly variable.

11. **MELOCHIA,** Linn.; Benth. et Hook. f. Gen. Pl. i. 223.

Calyx 5-cleft, bell-shaped. Petals 5, oblong-spathulate, marcescent. Stamens 5, opposite the petals, connate at the base; anthers 2-celled; cells parallel. Ovary sessile or stalked, 5-celled; ovules 2 in each cell. Styles 5, free or connate at the base. Capsule loculicidally 5-valved; cells 1-seeded. Seed ascending. Embryo straight.—Herbs or shrubs, with downy leaves.

Flowers smaller, in cymose clusters or spikes, axillary or terminal.—*Polychlæna*, Don, Gen. Syst. i. 488.

An extensive genus in the tropical districts of both hemispheres.

In addition to the two species mentioned below, it is likely that *M. pyramidata* occurs in Africa, as it has been found in Madagascar and other islands off the east coast. It may be known by its winged capsule.

Flowers in terminal clusters . . . . . 1. *M. corchorifolia.*
Flowers in axillary clusters . . . . . 2. *M. melissifolia.*

1. **M. corchorifolia,** *Linn. Sp.* 944. An erect branching herb or undershrub, thinly beset with stelliform hairs. Leafstalks about 1 in. long. Stipules subulate-lanceolate, shorter than the petioles. Leaves 1–3 in. long, wedge-shaped at the base, oblong-lanceolate, acutely serrate, palmately 5-costate, subglabrous above, thinly beset with villous hairs below. Flowers numerous, in dense, terminal or axillary, stalked cymes; pedicels very short; bracts numerous, subulate-lanceolate, setose at the edges. Calyx bell-shaped, 5-cleft; segments lanceolate, acuminate, ½ in. long. Petals obovate, stalked, white, longer than the sepals. Stamens coherent with the petals below; filaments free, flat, shorter than the petals to which they are opposite. Ovary oblong. Styles 5, distinct; stigmas strap-shaped, villose. Capsule subglobose, loculicidally 5-valved, longer than the persistent calyx. Seeds 1 in each cell, pendulous from the inner angle.—*Riedleia corchorifolia*, DC. Prod. i. 491. *Polychlæna ramosa*, Don, Gen. Syst. i. 488. *P. simplex*, Don, l. c. *Hibiscus Donii*, Walp. Rep. i. 304. *H. Endlicheri*, Walp. l. c.

Upper Guinea. Senegambia, *Bidjem!* Niger, *Barter!* St. Thomas, *Don!*
Nile Land, *Petherick!*
Mozamb. Distr. Zambesi, *Dr. Kirk!* Quillimane, *Peters.*
A widely diffused tropical weed, occurring in India, Australia, Mauritius, etc.

2. **M. melissifolia,** *Benth. in Hook. Journ. Bot.* iv. 127. Suffruticose, villose. Leaves on rather long stalks, ovate, subcordate, crenate-serrate, 3–5-costate, hairy on both surfaces. Flowers small, in sessile axillary clusters. Bracts linear, hispid, longer than the flowers; peduncles very short, 2-bracteolate. Calyx-teeth shallow. Petals obovate, exceeding the calyx. Staminal tube deeply cleft. Capsule depressed, globular, 5-valved. Seed grey, with blackish lines.

Upper Guinea. Senegambia, *Heudelot!* Niger, *Barter!*
The specimens on which this species was founded were collected in British Guiana, but they do not materially differ from the African forms.

12. **SCAPHOPETALUM,** Mast.; Benth. et Hook. f. Gen. Pl. i. 983.

Calyx of 5 valvate sepals, more or less coherent, sometimes forming a 2-valved calyx. Petals 5, hooded, nervose-striate, without appendages or lamina. Filaments combined into an angular, funnel-shaped, membranous tube, bearing at the upper margin 5 roundish reflexed staminodes, alternate with the petals; anthers in groups of 3 between the staminodes, more or less concealed within the concavity of the petals, 2-lobed; lobes divergent. Ovary

sessile, 5-lobed, 5-celled; ovules numerous, attached to the inner angle of each cell. Styles connate. Stigma obsoletely 5-lobed.—Shrubs. Leaves petiolate, oblong, unicostate. Flowers stalked, emerging from the trunk or older branches. Corolla yellow.

Inflorescence very long. Calyx-segments 5, nearly free . . 1. *S. longipedunculatum.*
Inflorescence fascicled, short. Calyx 2-valved.
Leaves oblong-lanceolate, tapering towards the base . . . 2. *S. Blackii.*
Leaves oblong-acuminate, contracted above the base . . . 3. *S. Mannii.*

1. **S. longipedunculatum,** *Mast. in Journ. Linn. Soc.* x. 28. *t.* 2. A shrub with tortuous branches. Petioles very short, about the same length as the subulate, obscurely striated stipules. Leaves oblong-lanceolate, acuminate, entire, smooth, 1-costate, coriaceous, glabrous, 4–6 in. long, 1–3 in. wide. Peduncles from the old wood, very long, pendulous or (?) trailing, bearing here and there minute root-like fibrils and terminating in a dichotomous many-flowered cyme. Bracts subulate, minute. Pedicels about 1 in. long. Flower-buds ovoid, acute. Sepals 5, distinct nearly to the base, spreading, oblong-lanceolate, downy on the outside, carinate on the inner surface near the base. Petals half the length of the sepals, erect, oblong, obtuse, cucullate at the apex, nervose-striate. Staminal tube membranous, bell-shaped, 5-angular, divided at the apex into 10 segments, 5 sterile, reflexed, rounded, alternating with 5 fertile lobes placed opposite the petals and each bearing 3 2-celled anthers; lobes divergent. Ovary oblong, 5-lobed, 5-celled. Ovules amphitropous, attached in a double line to the inner angle of each carpel. Style simple. Stigma minute.

Upper Guinea. Mount John, Kongui river, *Mann!*

A very curious plant as regards its long inflorescence, with the abortive pedicels (rootlets?) springing from it.

2. **S. Blackii,** *Mast. l.c.* 29. *t.* 3. *fig.* 8–14. A shrub, 4 ft. high. Petioles 3 4 lines long; stipules subulate-lanceolate, nervose-striate, as long as the petioles. Leaves 5 8 in. long, 2–4 in. wide, oblong, acuminate, glabrous. Peduncles scarcely longer than the petioles, fascicled from the axils of the fallen leaves. Bracts minute. Calyx coriaceous, bursting irregularly into 2 valves, glabrous externally, pilose within. Petals erect, concave, hooded, externally striate, shorter than the sepals. Staminal tube as in the preceding species. Ovary oblong-ovoid, obscurely 5-lobed, 5-celled. Style included.

Upper Guinea. Mount John, Kongui river, *Mann!*

Differs from the preceding especially in the inflorescence and calyx.

3. **S. Mannii,** *Mast. l.c.* 29. *t.* 3. *fig.* 1–7. A shrub with rugose branches. Petioles 3 4 lines long. Stipules lanceolate, striate, about as long as the petioles. Leaves subcordate, narrow above the base, subpanduriform, oblong-lanceolate, acuminate, glabrous, subcoriaceous, 8 9 in. long, 1 1½ in. wide. Pedicels fasciculate, 1 in. long, springing from the old wood or from the axils of the fallen leaves. Calyx glabrous, ultimately bursting by 2 oblong valves. Petals erect, yellow, hooded, striated, longer than the sepals. Staminal tube and ovary as in the former species.

Upper Guinea. Mount John, Kongui river, *Mann !*
Distinguished from its congeners by the peculiar form of the leaves.

13. LEPTONYCHIA, Turcz.; Benth. et Hook. f. Gen. Pl. i. 237 et 983.

Sepals 5, distinct. Petals 5, very short, concave, somewhat fleshy, coherent at the margins. Stamens 25; filaments united below; margin of the tube divided into 5 short subulate staminodes, opposite to the sepals, and 5 phalanges opposite to the petals, each phalange consisting of 2 fertile stamens and 2 antherless filaments placed outside the fertile stamens. Anthers 2-celled, oblong. Ovary 3-(5-)celled. Ovules numerous, attached in two vertical rows to the inner angle of each cell. Style cylindrical. Stigma minute, 3-(5-)toothed. Fruit oblong or subglobose, 3-celled, loculicidally 3-valved. Seeds 1 in each cell, large; testa black, covered by a red spongy aril; albumen horny. Embryo straight. Radicle pointing to the hilum. Cotyledons flat, foliaceous, subcordate, obscurely lobed, 3-costate. Plumule inconspicuous.—A shrub with shining evergreen, entire leaves. Flowers white, in axillary cymes.

A genus, established by Turczaninow on some species natives of Malacca and the Indian Archipelago.

Leaves on short stalks, rounded at the base, oblong-acuminate . . . 1. *L. urophylla.*
Leafstalks at least an inch long. Leaves tapering at the base, lanceolate . . . . . 2. *L. lanceolata.*

1. **L. urophylla,** *Welw. mss.* A shrub 5–6 ft. in height, with loosely spreading branches. Leafstalks ¼–½ in. long. Stipules subulate, pilose, as long as the petioles, deciduous. Leaves 4–5 in. long, 2–3 in. wide, evergreen (*Welwitsch*), roundish at the base, oblong, acuminate, smooth, 1-costate, smaller veins arcuate-reticulate. Flowers in axillary cymes. Peduncles shorter than the petioles, dividing into 2 or 3 pedicels, shorter than the flowers. Flower-buds oblong, acute, prismatic. Sepals 5, distinct, oblong, acute, downy, about ½ in. in length. Petals one-fourth the length of the sepals, thick, roundish, concave, ciliate, coherent at the margins. Stamens 25, in two rows?, coherent below into a short tube, half the length of the ovary, divided above into 5 subulate staminodes placed alternately with the petals and about equal to them in length, and into 5 phalanges, placed opposite to the petals and alternating with the short staminodes, each phalange is composed of 2 inner antheriferous filaments, nearly equalling the sepals, and of 2 antherless filaments placed rather externally to the fertile stamens and rather shorter than them. Ovary 3-(5-?)lobed, oblong, villose, 3–5-celled; placentas axile. Ovules. . . . Style cylindrical as long as the stamens. Stigma minute, terminal, 3-(5-)toothed. Capsule oblong obtuse or subglobose, 3-celled, loculicidally 3-valved; valves oblong, obtuse, coriaceo-ligneous, rugose and stellately tomentose on the exterior, shining and puckered on the inner surface. Seeds 1 in each cell, pendulous (?), ½ in. long, oblong, acute, subtriquetrous, with a black shining testa, nearly covered with a spongy scarlet aril.

Upper Guinea. Fernando Po, *Mann! Barter!* Ambas Bay, *Mann!*
Lower Guinea. Angola, *Dr. Welwitsch!*

Dr. Welwitsch's specimens enable me to give the characters of the fruit hitherto undescribed.

2. **L. lanceolata,** *Mast.* A shrub 12–15 ft. high, with glabrous branches. Leafstalks glabrous, 1 in. in length, smooth. Leaves leathery, lanceolate, acuminate, entire, tapering at the base, 1-costate, arcuate-venose, 8–12 in. long, 3–4 in. wide. Sepals 4, linear-lanceolate. Petals villose. Ovary villose, 4-celled. Style cylindrical, longer than the stamens.

Upper Guinea. Fernando Po, *Mann!*

I have only examined fragments of flowers of this species, the staminal arrangements of which, however, were such as to leave no doubt that the plant belongs to this genus. It may possibly be a mere variety of the preceding.

14. BUETTNERIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 225.

Calyx 5-cleft. Petals concave at the base; apex 2-lobed, inflexed, adnate to the tube of the stamens, prolonged at the back into a long, simple or 3-fid appendage. Staminal tube with solitary anthers between the barren lobes. Anthers sessile or on short stalks, 2–3-celled; cells parallel. Ovary sessile, 5-celled with 2 ovules in each cell. Style slightly 5-cleft at the apex. Capsule globose. Carpels seceding septicidally, each 2-valved, covered with stout spines at the back and 1-seeded. Seed solitary, ascending, exalbuminous. Cotyledons convolute around the radicle.—Undershrubs or climbing shrubs, often spiny. Flowers small, purplish, stalked, umbellate or cymose.

A genus including between 40 and 50 species, natives of tropical Asia and America. The only species known in tropical Africa, and that imperfectly, is the one a description of which is here given.

1. **B. africana,** *Mast.* A tree with puberulous branches. Leaves roundish, cordate-ovate, acute, denticulate, palmately 5-nerved, smooth, 5 6 in. long, 4–5 in. wide. Leafstalks shorter than the leaves. Stipules subulate. Flowers. . . . Capsule subglobose, the size of a walnut, septicidally 3–5-valved; valves muricate.

Lower Guinea. Congo, *Smith!*

Imperfect specimens of this plant were collected by Smith, and do not appear to have been met with by any other collector. The plant does not appear to be mentioned in Brown's Appendix to Tuckey's Congo.

Among the specimens collected by Dr. Kirk in the Zambesi valley (Butoka) are fragments of a tree with separate fruits, probably Sterculiaceous, but in too imperfect a state to be referred with certainty to this family. The branches are purplish, sprinkled with black dots. Petioles cylindrical, thickened at the apex and at the base. Leaves leathery, cordate, palmately 5-lobed; lobes oblong, entire, sinuses obtuse, surface smooth. Peduncle, as it seems, terminal, marked with annular cicatrices. Thalamus or gynophore? setose at apex. Carpels 4, samaroid, obliquely ovoid, horny at the base, indehiscent, 1-celled, 1-seeded, prolonged into a long membranous entire wing, 1–2 in. long. Albumen apparently horny.

Order XXVII. TILIACEÆ (by Dr. Maxwell T. Masters).

Flowers regular, hermaphrodite. Sepals 5 or fewer, distinct, rarely coherent, valvate. Petals 5, sometimes absent, alternate with the sepals, imbricate, glandular or glandless at the base internally. Stamens indefinite, rarely definite, inserted on a short contracted torus or on an elongated one. Filaments free or more or less united below, sometimes 4–5-adelphous, all fertile or some sterile. Anthers 2-celled, linear or globose, dehiscing longitudinally or by pores. Ovary free, 2–10-celled. Style entire; stigmas usually small, as many as the cells of the ovary, sometimes large; ovules anatropal, attached to the inner angles of the cells of the ovary, sometimes solitary, pendulous, generally numerous, in 2 rows in each cell. Fruit 2–10-celled or 1-celled by abortion, sometimes divided transversely by spurious partitions, dry or fleshy, loculicidally dehiscent, indehiscent or separating into cocci. Seeds solitary or few, ascending, pendulous or transverse, exarillate (rarely arillate); testa coriaceous, sometimes pilose. Albumen fleshy. Embryo straight. Cotyledons roundish, leafy. Radicle next to the hilum. —Trees or shrubs or sometimes herbaceous plants. Leaves alternate, generally more or less oblique at the base, penninerved or palminerved, simple or lobed, glabrous, pilose or stellate-tomentose. Stipules in pairs, deciduous. Flowers cymose, lateral and terminal, rarely axillary, but often by the side of the leaf.

An extensive Order, especially abundant in the tropics. They approach *Malvaceæ* and *Sterculiaceæ* in their valvate calyx, but differ in their 2-celled anthers and generally free or but slightly coherent stamens.

The bark in many of these plants is very fibrous, even in the herbaceous species the fibre is important, as in the case of "jute," the product of some species of *Corchorus*. The same fibrous character is present to a notable extent in the fruit of some species. Many of them abound in mucilaginous juice.

Tribe I. **Brownlowieæ.**—*Sepals combined into a* 3–5*-fid campanulate calyx. Anthers small, globose; lobes sometimes confluent at the apex.*

Carpels distinct, 2-valved, wingless . . . . . 1. Christiana.
Carpels combined, winged . . . . . 2. Carpodiptera.

Tribe II. **Grewieæ.**—*Sepals distinct. Petals glandular at the base internally. Torus elongated. Anthers subglobose or short, lobes parallel.*

Fruit indehiscent drupaceous globose or lobed, not prickly . . . 3. Grewia.
Fruit more or less dehiscent. Capsule spiny . . . . . 4. Triumpetta.

Tribe III. **Tilieæ.**—*Sepals distinct. Petals not glandular. Torus contracted.*

Capsule loculicidally dehiscent, echinate or smooth and pod-like.
Seeds indefinite.
Outer stamens barren, inner fertile, numerous. Capsule globose, echinate . . . . . 6. Sparmannia.
Outer stamens barren. Fertile stamens few . . . . . 5. Honckenya.
Stamens all fertile.
Capsule long, pod-like . . . . . 7. Corchorus.
Capsule globose, prickly . . . . . 8. Ancistrocarpus.
Fruit indehiscent.
Flowers involucrate. Seeds wingless . . . . . 9. Duboscia.
Flowers exinvolucrate. Seeds winged . . . . . 10. Desplatzia.

TRIBE IV. **Apeibeæ.**—*Sepals distinct. Petals glandless. Torus short. Anthers linear, crested. Ovary* 6–∞*-celled. Fruit indehiscent,* ∞*-seeded.*

11. GLYPHÆA.

1. CHRISTIANA, DC.; Benth. et Hook. f. Gen. Pl. i. 232.

Calyx bell-shaped, irregularly 3–5-fid. Petals 5, naked at the base. Stamens indefinite, free, all fertile, not inserted on a raised torus. Anthers subglobose. Ovary. . . . Carpels 2–5, ultimately seceding, subglobose, 1-locular, 2-valved. Seed 1 in each cell, ascending; testa crustaceous, black, spotted with grey. Albumen fleshy. Cotyledons leafy.—A tree of lofty stature and with ample foliage.

This genus is mentioned by Robert Brown (Botany of Congo, Tuckey's Expedition, p. 428), who remarks on the want of symmetry between the calyx and the corolla, and considers the genus to be nearly allied to *Ventenatia*. Brown saw only fruiting specimens, and indeed no younger specimens exist in herbaria.

1. **C. africana,** *DC. Prod.* i. 516. A tree whose younger branches, leafstalks, leaves, outer surface of calyx and of carpels, are all more or less densely clothed with yellowish stelliform tomentum. Leafstalks 3–4 in. long. Stipules linear, persistent. Leaves cordate-ovate acute or oblong, palmately 5-costate, 6 12 in. long, 4–8 in. broad, smooth above, densely tomentose below. Flowers numerous, in terminal, much-branched, corymbose cymes; pedicels flattened. Calyx 3-lobed, persistent. Carpels 2–5, shortly stalked, each one subglobose, the size of a small pea, 1-celled, 1-seeded, splitting into 2 boat-shaped valves, about ½ in. long.—*C. cordifolia,* Hook. f. Fl. Nigrit. 238.

Upper Guinea. Quorra, *T. Vogel!*
Lower Guinea. Congo, *Smith!*
I fail to find any sufficient marks of distinction between the original *C. africana* and that described by Dr. Hooker, and have therefore combined the two.

2. CARPODIPTERA, Grisebach; Benth. et Hook. f. Gen. Pl. i. 232.

Calyx bell-shaped, 5-fid. Petals 5, glandless at the base. Stamens indefinite, free or slightly coherent at the base; torus not prolonged. Staminodia 0. Anthers roundish. Ovary 2-celled (4-celled?); ovules solitary and pendulous from the upper and inner angle of each cell of the ovary; stigmas distinct, sessile, large, subpetaloid (*Grisb.*). Capsule subglobose, 2-valved, each valve extended into 2 long, unequal, obtuse, foliaceous wings. Seeds solitary in each cell, pendulous. Albumen fleshy.—Trees with entire or cordate leaves. Flowers small, in axillary cymes.

Grisebach described a Cuban plant upon which he founded the genus. A second species is native of S.E. tropical Africa.

1. **C. africana,** *Mast.* A tree with greyish ash-coloured bark. Leafstalks 2 3 in. long, thinly covered with stelliform pubescence. Stipules caducous. Leaves 4 6 in. long, oblong, acute, rounded at the base, sometimes obscurely lobed, unicostate; venation arcuate. Peduncle extra-axillary, as long as or longer than the leafstalks, dividing into 5 or 6 cymose pedicels,

each about an inch long. Calyx bell-shaped, 5-cleft; lobes ovate, acute, ¼ in. long, velvety on the outer surface. Petals oblong, glandless, longer than the sepals. Stamens indefinite, hypogynous; thalamus not prolonged. Capsule subglobose, 2-valved, 1-celled, each valve provided with 2 unequal, oblong, obtuse, foliaceous wings 1 or 2 in. in length, ½–¾ in. in breadth. Seed solitary, pendulous, villose.

Mozamb. Distr. Rovuma river, *Dr. Kirk!*

Closely allied to a Cuban species described by Grisebach, *C. cubensis*, but in the African plant the leaves as well as the carpellary wings are longer and more pilose.

3. GREWIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 233.

Flowers regular, hermaphrodite, pentamerous. Sepals distinct. Petals unguiculate, unguis thickened, glandular, ciliate, rarely wanting. Stamens indefinite, all fertile, free, springing from a raised glandular torus. Ovary 2–4-celled; cells 2–∞-ovuled. Style subulate; stigma shortly 2–4-lobed. Drupe 1–4-stoned, entire or lobed. Stones 1–2 or more-seeded and divided by spurious dissepiments between the seeds. Seeds ascending or horizontal. Albumen fleshy or horny. Cotyledons flat, leafy.—Trees or shrubs frequently covered with stelliform hairs. Leaves entire or lobed, 3–7-nerved. Flowers yellow or pink, in axillary or terminal cymes.

An extensive genus whose species are for the most part tropical and subtropical. Many of the species are exceedingly variable, and not a little difficult of discrimination in the dried state. Possibly some of the forms here kept separate will have to be combined when further material shall be examined.

Cymes axillary, subaxillary or opposite to the leaves. Drupes fleshy.
- Peduncles erect, much longer than the petioles. Serratures of leaves glandular . . . . . 1. *G. columnaris.*
- Peduncles shorter or not greatly longer than the petioles. Serratures not glandular. (See *G. glandulosa.*)
  - Petals roundish, not more than half the length of the sepals.
    - Leaves truncate at the apex . . . . . 2. *G. truncata.*
    - Leaves not truncate at the apex.
      - Leaves glabrous on both surfaces.
        - Drupe 1-lobed . . . . . 3. *G. Caffra.*
        - Drupe 2-lobed . . . . . 6. *G. lævigata.*
        - Drupe 4-lobed.
          - Leaves parallel-veined . . . . . 7. *G. megalocarpa.*
          - Leaves arcuate-venose . . . . . 8. *G. lepidopetala.*
        - Leaves pilose on both surfaces . . . . . 5. *G. guazumifolia.*
        - Leaves albido-tomentose below . . . . . 4. *G. micrantha.*
  - Petals oblong or lanceolate, more than half the length of the sepals.
    - Stipules oblique, falciform, large.
      - Leaves covered with little tufts of stellate hairs . . . . 9. *G. inæquilatera.*
      - Leaves subglabrous or uniformly downy . . . . . 19. *G. tiliæfolia.*
    - Stipules not falciform, minute.
      - Leaves glabrous or nearly so, not white beneath.
        - Leaves roundish.
          - Leaves rounded or subcordate at the base, 5-nerved . 10. *G. populifolia.*
          - Leaves 3-nerved, tapering at the base, rarely rounded 11. *G. occidentalis.*
        - Leaves oblong or lanceolate.
          - Leaves truncate . . . . . 2. *G. truncata.*

Leaves not truncate.
Leaves glandular-viscid . . . . . 12. *G. glandulosa.*
Leaves not glandular.
Drupe globose, rarely lobed.
Leaves tapering at the base, secondary veins straight . . . . . 13. *G. trichocarpa.*
Leaves rounded at the base, secondary veins curved . . . . . 14. *G. carpinifolia.*
Drupe distinctly 4-lobed . . . . . 11. *G. occidentalis.*
Leaves smooth or nearly so above, white beneath.
Petals very short . . . . . 4. *G. micrantha.*
Petals oblong-lanceolate.
Leaves curve-veined . . . . . 15. *G. salvifolia.*
Leaves feather-veined.
Drupes black. Leaves oblong-lanceolate . . . . 16. *G. mollis.*
Drupes red. Leaves ovate . . . . . 17. *G. cyclopetala.*
Leaves tomentose, especially below.
Leaves roundish, 5–7-nerved.
Stipules subulate, prominently unicostate . . . . 18. *G. asiatica.*
Stipules lanceolate; nerves not prominent.
Leaves obliquely cordate; arborescent . . . . 19. *G. tiliæfolia.*
Leaves rounded at the base, rarely subcordate; herbaceous or suffruticose . . . . . 20. *G. venusta.*
Stipules broadly ovate, acute; arborescent . . . . 21. *G. villosa.*
Leaves oblong, 3 5-nerved.
Stipules large, falcate, oblique, acuminate . . . . 9. *G. inæquilatera.*
Stipules subulate-lanceolate.
Leaves oblong-obtuse, covered with down on both surfaces . . . . . 22. *G. flava.*
Leaves oblong-acute, smooth or with rather long silky hair . . . . . 23. *G. pubescens.*
Leaves pilose or rough on both surfaces.
Petals deeply 2-parted . . . . . 24. *G. Forbesii.*
Petals notched or entire.
Ovules many in each cell of the ovary . . . . . 25. *G. pilosa.*
Ovules 2 in each cell of the ovary.
Leaves oblong or roundish, 1–3 in. long . . . . 5. *G. guazumifolia.*
Leaves minute . . . . . 26. *G. parvifolia.*
Cymes panicled at the ends of the branches, many-flowered.
Cymules exinvolucrate.
Flower-buds subglobose or oblong.
Leaves feather-veined . . . . . 27. *G. ferruginea.*
Leaves curve-veined . . . . . 28. *G. angolensis.*
Flower-buds cylindrical oblong or club-shaped.
Leaves oblong, not cordate.
Leaves lanceolate, thinly pilose. Flowers large . . . . 29. *G. tetragastris.*
Leaves oblong-acuminate, glabrous. Flowers small . . . 31. *G. coriacea.*
Leaves cordate, densely tomentose . . . . . 30. *G. salicifolia.*
Cymules involucrate.
Nut 4-celled, 4-seeded. Stipules entire. (Sect. *Microcos.*) . 32. *G. floribunda.*
Cymules with or without involucres. Drupes pyriform, fibrous, 1-celled, 1-seeded. (Sect. *Omphacarpus.*)
Stipules entire.
Fruit downy . . . . . 33. *G. malococarpa.*
Fruit glabrous . . . . . 34. *G. occidentalis.*
Stipules pinnatifid . . . . . 35. *G. palmatifida.*

1. **G. columnaris,** *Smith; DC. Prod.* i. 510. A shrub with slender,

purplish, puberulous branches. Stipules subulate. Leafstalks ¼ in. long, puberulous. Leaves oval, acute, subscabrous, crenate-serrate, lower serratures glandular, 3-costate, veins arcuate. Cymes stalked, extra-axillary and terminal. Peduncles two or three times longer than the leafstalks, dividing into 3–6 pedicels. Flower-buds subglobose. Sepals leathery, stellate-tomentose. Petals oblong, emarginate. Ovary villose. Fruit 4-lobed; lobes subglobular, the size of a small pea.

Mozamb. Distr. East tropical Africa and Mombas island, *Bojer!*

Native also of the peninsula of India. The African specimens of this species that have come under observation are imperfect, so that the character of the fruit has been described from Indian specimens.

2. **G. truncata,** *Mast.* A shrub sparingly covered with stelliform tomentum. Petioles ½ in. long. Stipules subulate. Leaves 6–7 in. long, 3–4 in. wide, thin, obliquely subcordate, oblong, retuse, shortly acuminate, 3-costate; venation feather-veined. Cymes terminal or opposite the leaves, many-flowered. Pedicels short, not exceeding 1 in. in length. Petals broadly ovate, obcordate. Gynophore short.

Mozamb. Distr. Between Lupata and Tette, Zambesi, *Dr. Kirk!*

Although the materials are very imperfect, there can be little doubt as to the distinctness of this species, which may readily be recognized by its peculiar leaves.

3. **G. Caffra,** *Meisner in Hook. Lond. Journ. Bot.* ii. 53. A shrub or small tree, often fluted at the base, with numerous, widely-spreading, slightly pilose, purplish, lenticellate branches. Petioles ¼ in. long, pilose. Stipules linear, setaceous, equalling the petioles. Leaves thin, nearly glabrous, 1–3 in. long, ½–¾ in. wide, tapering or obliquely subcordate at the base, oblong, acute or acuminate, finely toothed, 3-costate, arcuate-venose. Peduncles axillary, ½–¾ in. long, dividing into 2–3 diverging pedicels about equal in length to the petioles. Flower-buds cylindrical or somewhat angular, oblong, slightly tumid at the base. Sepals oblong. Petals obovate, entire or slightly emarginate, half the length of the sepals. Ovary 2-celled; ovules numerous in each cell of the ovary; stigmatic lobes linear-subulate. Drupe subglobose, the size of a small cherry, covered when young with tufts of appressed, stelliform, rigid hairs.

Lower Guinea. Loanda, *Dr. Welwitsch!*

Mozamb. Distr. Shamo, *Dr. Kirk!*

Occurs also in Natal. In Dr. Welwitsch's specimens the leaves are more nearly cordate than in the specimens from Eastern Africa.

4. **G. micrantha,** *Boj. in Herb. Kew.* A shrub, the younger branches, petioles, and pedicels covered with rufous down. Petioles ¼–½ in. long. Stipules falciform, equalling the leafstalks. Leaves 1–2 in. long, 1 in. wide, oblong, subcordate, acute, glandulose, serrate, shining above, whitish, with a few pilose hairs on the lower surface, 3-costate; venation arcuate. Peduncles solitary or twin, axillary or terminal, shorter than the leaves, dividing above into 2–3 pedicels. Flower-buds ovoid-oblong. Sepals oblong. Petals very short, notched. Fruit 2–4-lobed; lobes small, fusiform, yellowish, covered with a few short hairs.

Mozamb. Distr. Mombas Isle, *Bojer!* Tette, Zambesi, *Dr. Kirk!*

5. **G. guazumifolia,** *Juss. in Ann. Mus.* iv. 89. *t.* 48. *f.* 3; *DC. Prod.* i. 508. A shrub with erect or spreading villose branches. Leafstalks villose, ¼ ½ in. in length. Leaves obliquely subcordate, ovate or oblong, acute, minutely serrate, pilose above, downy beneath, 3–5-nerved, feather-veined, 2–4 in. long, 1–1½ in. wide. Peduncles axillary or nearly so, about an inch in length, dividing into 2–3 short pedicels. Drupe globose, the size of a small cherry, slightly pilose, with 4 nuts. Nuts 1–3-celled.

Upper Guinea. Senegambia, *Perrottet!*
Lower Guinea. Angola, *Dr. Welwitsch!*
Of this species I have only seen imperfect specimens. Jussieu describes the petals as very short. I am doubtful whether or no Dr. Welwitsch's specimens may not constitute the type of a new species.

6. **G. lævigata,** *Vahl; DC. Prod.* i. 510. A shrub or small tree, with subglabrous branches. Leaves on very short stalks, oval, tapering or rounded at the base, serrated near the acute or acuminated apex, smooth on both surfaces, 3-costate, arcuate-venose, 2–3 in. long, 1–2 in. wide. Peduncles solitary, axillary or two or three together, two or three times longer than the leafstalks, 2–3-flowered. Sepals linear, narrow, three or four times longer than the oblong, entire, bluntish petals; torus short. Drupe deeply 2-lobed; lobes the size of small peas, glabrous; nuts 1–2 in each lobe, 1–2-celled.—*G. sepiaria,* Roxb. Hort. Calcutt. Cat. *G. multiflora,* Juss. in Ann. Mus. iv. 89.

Mozamb. Distr. Rovuma river, *Dr. Kirk!*
Occurs also in India and Australia.

7. **G. megalocarpa,** *P. de Beauv.; DC. Prod.* i. 511. A shrub 3–4 ft. in height, with very numerous, spreading, sometimes sarmentose branches. Leaves on short pilose stalks, oblong-ovate subacuminate, sometimes rhomboid, serrate, nearly glabrous, 3-nerved, feather-veined, 1–2 in. long, 1 ½ in. wide. Cymes terminal or opposite the leaves. Peduncles pilose, ½ in. long, dividing into 2–3 pedicels. Flower-buds ovoid-oblong. Flowers large, 1½–2 in. across. Sepals oblong-ovate. Petals glandular; lamina very short. Style longer than the stamens. Fruit of 4 pea-shaped, smooth, purplish lobes.

Upper Guinea. Oware, *Beauvois.*
Nile Land. Abyssinia, *Dillon and Petit!*
Lower Guinea. Angola, *Dr. Welwitsch!*

8. **G. lepidopetala,** *Garcke in Pet. Mossamb. Bot.* i. 135. A shrub or small tree. Leaves on very short stalks, obovate or oblong-acuminate, crenate-serrate, glabrous, 3-nerved, veins anastomosing; 1–2 in. long, 1 in. wide. Stipules lanceolate. Flowers in terminal corymbose cymes. Peduncles 1 in. long, dividing into 2–3 pedicels. Flower-buds oblong, obtuse. Sepals oblong, pubescent. Petals half the length of the sepals, orbicular, glandular beneath. Drupe 4-lobed, villose, ultimately smooth.

Mozamb. Distr. Senna, Zambesi, *Dr. Kirk! Peters.*

9. **G. inæquilatera,** *Garcke in Pet. Mossamb. Bot.* i. 134. A shrub, sometimes with prostrate, purplish, lenticellate branches, and other times forming a small tree; the younger shoots, as well as the petioles, pedicels,

under surface of the leaves, and outer surface of the calyx, more or less densely covered with tufts of rufous stellate hairs. Leafstalks ½ in. long; stipules nearly as long as the petioles, subfalcate, acuminate. Leaves 1½–5 in. long, 1–3 in. wide, obliquely subcordate, oblong-acuminate, serrate, smooth above, albido-tomentose below, 3-costate, venation straight. Peduncles axillary or nearly so, about the length of the petioles, dividing above into 2–3 pedicels. Flower-buds roundish, oblong. Sepals oblong-lanceolate, ultimately spreading. Petals half the length of the sepals, obovate, acuminate, with a few hairs at the base of the claw. Stamens more or less pentadelphous. Fruit 2-lobed; lobes globose, the size of a small cherry, purplish, ultimately smooth.

Lower Guinea. Angola, *Dr. Welwitsch!*
Mozamb. Distr. Senna, Zambesi, *Peters; Drs. Kirk and Meller!*

A species that varies greatly in habit, size of parts, etc., but one that may be generally recognized by the peculiarly 1-sided leaves and stipules and the floccose tomentum.

10. **G. populifolia,** *Vahl; DC. Prod.* i. 511. A shrub, with slender nearly glabrous branches. Leafstalks ¼–¾ in. long, with a few stelliform hairs, slightly dilated at the apex; stipules subulate. Leaves 1–2 in. long, 1 in. wide, subcoriaceous, roundish or oblong, subcordate or tapering at the base, obtuse or sometimes pointed at the apex, crenate-serrate or dentate and frequently thickened at the margins, glabrous above, slightly tomentose below, palmately 3–5-nerved, arcuate-veined. Peduncles solitary or in pairs opposite the leaves, or terminal on short contracted branches or "spurs," dividing into 2 3 short pedicels or 1-flowered by abortion. Flower-buds angular, oblong, pointed. Sepals oblong, ¼ ⅓ in. long. Petals oblong, emarginate, shorter than the sepals. Ovary villose. Drupe 1 4-lobed; lobes yellowish, smooth, the size of small peas, each with a 2-celled stone.—*G. betulifolia,* Juss. in Ann. Mus. iv. 92. pl. 4. f. 1. *G. reticulata,* Hochst. Pl. Schimp. Abyss. *? G. crenata,* Hochst. Pl. Schimp. Abyss. *G. ribesiæfolia,* Hochst. Pl. Schimp. Abyss. *G. membranacea,* Rich. Fl. Abyss. i. 90.

Widely distributed throughout the whole of tropical Africa, found also in Egypt, Persia, Arabia, Scinde, etc.

Very variable in the form of the leaves, which, however, are usually small and nearly glabrous.

11. **G. occidentalis,** *Linn.; DC. Prod.* i. 511. A shrub; the younger portions covered with ferruginous tomentum. Leafstalks ¼ ½ in. long. Leaves 1–2 in. long, 1 in. wide, subcordate, roundish-ovate, obtuse, dentate, 3-nerved, venation arcuate, glabrous or with a few short bristles along the nerves. Peduncles opposite to the leaves or terminal, 3 6-flowered. Flower-buds oval-oblong. Sepals oblong-lanceolate. Fruit purplish, slightly hairy, 4-lobed; lobes subglobose, the size of small peas.—*? G. crenata,* Hochst. Pl. Schimp. Abyss.

Nile Land. Abyssinia, *Schimper!* Karague, *Speke and Grant!*

The plant occurs also in S. Africa.

12. **G. glandulosa,** *Vahl; DC. Prod.* i. 510. A shrub or small tree (?); younger branches thinly covered with ferruginous tomentum. Leafstalks ½

in. long. Stipules linear, falcate, shorter than the petioles. Leaves 3–5 in. long, 1–2 in. wide, obliquely subcordate, oblong-lanceolate, acuminate, crenate-serrate, lower serratures glandular, feather-veined, nearly smooth on both surfaces or with a few hairs on the nerves beneath. Peduncles axillary, shorter than the petioles, dividing into 2 short pedicels. Flower-buds obovoid. Sepals linear, nearly an inch in length. Petals roundish, nearly as large as the sepals. Ovary villose. Fruit cubical, 1 in. or 1½ in. diam., 4-lobed, pilose, ferruginous.—*G. ulmifolia*, Boj. in Herb. Kew.

Mozamb. Distr., Mozambique, *Forbes!* Zanzibar, *Dr. Kirk! Bojer!*

Found also in Mauritius and Madagascar. The glandular leaves and large roundish petals form good marks of this species, which is nearly allied to *G. didyma*, Roxb., but has shorter petals.

13. **G. trichocarpa,** *Hochst. in Rich. Fl. Abyss.* i. 89. A shrub or small tree, with numerous slender, slightly pilose branches. Petioles scarcely ¼ in. long, dilated at the apex. Leaves thin, subglabrous, inequilateral, tapering at the base, elliptic, acuminate, dentate, 3-nerved, feather-veined, 2–3 in. long, 1 in. wide. Peduncles axillary, short, dividing into 2–3 divergent pedicels. Sepals 3-nerved. Petals obovate, notched, one-third shorter than the sepals. Ovary 2-celled. Ovules 2 or more in each cell. Stigmas linear. Fruit globular, pisiform, covered with rigid setæ, interspersed among stellate hairs.

Nile Land. Abyssinia, *Schimper!*

Closely allied to *G. occidentalis*, if not identical with that species. In the young state, however, the fruit appears not to be 1-lobed.

14. **G. carpinifolia,** *Juss.; DC. Prod.* i. 510. A shrub or small tree, with spreading, purplish, slightly pilose branches. Leafstalks ¼ in. long. Stipules subulate. Leaves thin, smooth on both surfaces or slightly pilose, especially beneath, subcordate, roundish at the base, oblong, acute or acuminate, serrated, 3-costate, secondary veins curved; 1 3 in. long, 1–1½ in. wide. Peduncles axillary, about the same length as the petioles, dividing into 2–3 pedicels of equal length. Flower-buds oblong, dilated at the base. Sepals oblong. Petals oblong, slightly emarginate or entire, two-thirds the length of the sepals. Anthers glabrous. Ovary by abortion 1-celled, 1-2-ovulate. Fruit globose, glabrous, rarely somewhat 4-lobed, about the size of a small cherry.—*G. biloba*, Don, Gen. Syst. i. 548. *? G. tembensis*, Fresen. in Mus. Senck. ii. 158.

Upper Guinea, *Don! T. Vogel!*
Nile Land. Abyssinia, *Schimper! Rüppell.*

G. tembensis, Fresen., is apparently only a form of this species, with thicker, more pilose, and sometimes glandulose-serrate leaves. The same species occurs in India, and is distinguished from *G. pilosa* chiefly by the smaller number of ovules in each cell of the ovary.

15. **G. salvifolia,** *Heyne; DC. Prod.* i. 500. A shrub or small tree; the younger branches, petioles, and pedicels covered with ferruginous or pale down. Leafstalks about ¼ in. long, dilated at the apex. Stipules subulate, acuminate, longer than the petioles. Leaves 1 3 or 4 in. long, ½ in. wide, obliquely subcordate, oblong or lanceolate, minutely serrate or entire, 3-costate, arcuate-venose, smooth and shining above, cinereo-tomentose below;

Peduncles axillary or terminal, solitary or twin, about the same length as the leafstalk, and dividing into 3 pedicels. Flower-buds cylindrical, oblong. Flowers ½ in. in diam. Sepals oblong, obtuse, cinereo-tomentose; nerves prominent. Petals notched, shorter than the stamens. Ovary pubescent. Drupes 1–2-lobed; lobes globose, the size of a small pea, thinly covered with short bristly hairs, ultimately glabrous and each containing a bony 4-celled nut. Seeds 1 in each cell.—*G. bicolor*, Juss. Ann. Mus. iv. 90. t. 50. f. 2. *G. Rothii*, DC. Prod. i. 509. *G. discolor*, Fresen. in Mus. Senck. ii. 159. *G. cinerea*, Rich. Fl. Abyss. i. 86. *G. pallida*, Hochst. Pl. Schimp. Abyss.

Widely diffused throughout all districts of tropical Africa, extending also to Abyssinia and Scinde, and subject to considerable variation.

16. **G. mollis,** *Juss.; DC. Prod.* i. 510. A shrub or small tree, with glaucous, purplish, often flattened branches. Leafstalks ¼–½ in. long, albido-tomentose. Stipules subulate. Leaves 3–5 in. long, 1 in. wide, obliquely subcordate, oblong-lanceolate, serrate, scaberulous above, albido-tomentose below, 3-costate, feather-veined. Peduncles 1–2, axillary, as long as the leafstalks, each dividing into 3 short pedicels. Flower-buds roundish or oblong. Flower yellow. Sepals linear-oblong, downy externally. Petals oblong, tapering and almost glandless at the base. Torus short. Ovary villose; ovules 1 in each cell. Fruit of 2 purplish globose lobes the size of small peas.—*? G. africana*, Mill. in DC. Prod. i. 512.

Upper Guinea. Senegambia, *Adanson;* Aboh, Nupe, Niger, *Barter!*
Nile Land. Gallabat, *Schweinfurth!* Sennar, *Kotschy!* M'Komah, *Speke and Grant!*

A very distinct-looking species. The bark is stated by Barter to be used for the sake of its mucilage in soups. It resembles *G. venusta*, Fresen., but differs in its narrower lower leaves.

17. **G. cyclopetala,** *Wawra and Peyritsch. Sert. Benguel.* 19. A shrub, with spreading slightly pilose branches. Leafstalks ¼ in. long. Leaves 1–3 in. long, 1–1½ in. wide, leathery, obliquely cordate, oblong, acuminate, denticulate, subglabrous above, albido-tomentose below, 3-costate, ribs rufously hirsute, feather-veined. Peduncles opposite to the leaves, as long as or longer than the leafstalks, dividing into 2 or 3 pedicels, equalling the common stalk. Flowers. . . . Fruit globose, 1–2-lobed; lobes globular, red, of the size of small peas, 6-celled, 6-seeded.

Lower Guinea. Angola, *Dr. Welwitsch!*

Very like some of the forms of *G. bicolor*, but may be distinguished by the broader leaves and the feathered venation. It is open to doubt whether Dr. Welwitsch's plant belongs to the above species. Wawra and Peyritsch describe their plant as having leaves with thick margins, scabrid on the upper surface, greyish beneath. The petals are moreover described as suborbicular, emarginate, smaller than the sepals.

18. **G. asiatica,** *Linn.; DC. Prod.* i. 511. A shrub or small tree, covered in all the younger portions with yellowish stelliform tomentum. Leafstalks 1 in. long, dilated at the apex. Stipules subulate-lanceolate, prominently 1-nerved, half the length of the petiole. Leaves 4–5 in. long, 3–4 in. broad, obliquely cordate, roundish or oblong-acuminate, irregularly toothed, palmately 5-costate, smaller veins parallel, not arching, softly

tomentose on both surfaces. Peduncles axillary or opposite the leaves, longer than the leafstalks, dividing above into 3 branches. Flower-buds oblong, tumid at the base. Sepals oblong, twice the length of the narrow-oblong emarginate petals. Style equal to the stamens. Ovary 4-lobed. Drupe 4-lobed or 1-lobed by abortion; lobes downy, roundish, the size of a small pea.

Upper Guinea. Niger, *Barter!*
South Central. Koobie to N. Shaw Valley, *Chapman and Baines!*

A common Indian plant, subject to much variation. The African specimens are more downy on the upper surface of the leaves than is the case in the Indian plants.

19. **G. tiliæfolia,** *Vahl; DC. Prod.* i. 511. A shrub; the younger portions covered with a short dense coating of felted hairs, rarely entirely glabrous. Leaves stalked, obliquely cordate, roundish, acuminate, irregularly toothed. Stipules falcate-lanceolate. Peduncles axillary or emerging a little on one side of the petiole, equal to or exceeding the petiole, 3 5-flowered. Sepals linear-oblong. Petals oblong, notched at the apex, half the length of the sepals. Drupes 2- rarely 4-lobed; lobes globose.

Mozamb. Distr. Mozambique, *Peters.*

A common Indian plant. I have not seen any African specimens, unless indeed *G. venusta*, Fresenius, be a form of this species.

20. **G. venusta,** *Fresen. in Mus. Senck.* ii. 159. An herbaceous perennial or sometimes an undershrub. Branches decumbent or erect, simple or slightly branched, more or less densely covered with white stelliform tomentum. Leafstalks 1 in. or more in length, downy. Stipules subulate-lanceolate. Leaves 3–5 in. long, 2 4 in. wide, roundish oblong, acute or obtuse, subcordate or rounded at the base, crenate-serrate, palmately 3–5-nerved; nerves prominent, especially below, venation arcuate, scabrous above, clothed with soft white tomentum below. Cymes many-flowered, extra-axillary; peduncles short, dividing into 2-3 slender pedicels ¾ in. long. Sepals oblong, downy outside. Petals half the length of the sepals, oblong, emarginate. Ovary villose. Drupe 2 4-lobed; lobes subglobose, the size of a large pea, crustaceous, copper-coloured, pilose.

Upper Guinea. Niger, *Barter!*
Nile Land. Abyssinia, *Roth!*
Lower Guinea. Angola, *Dr. Welwitsch!*

This species, which occurs also in Jhelum and other parts of India, resembles *G. villosa*, but may be known by its more herbaceous habit, its narrower stipules, and its longer and more numerous pedicels, and its usually 4-lobed fruit.

G. nana, Wall. Cat. 1102, seems closely allied to this species.

21. **G. villosa,** *Willd.; DC. Prod.* i. 512. A small shrub; the younger portions covered with long setaceous hairs. Petioles ¼–1 in. long. Leaves 1–3 in. long, suborbicular, obliquely cordate, serrate, serratures ciliate, 3 5-nerved, feather-veined; nerves and veins prominent, rugose above, villose beneath. Stipules broad, leafy. Flowers nearly sessile, in close cymes placed along the sides of the branches. Sepals oblong, acute. Petals oblong, notched, much shorter than the sepals. Torus setose. Fruit globular, the size of a cherry, crustaceous, coppery, pilose, with 4 1 2-seeded stones. —*G. echinulata*, Delile, Voy. Meröe, Bot. 82, *G. corylifolia*, Guill. et Perr. Fl. Seneg. i. 95.

Widely distributed throughout tropical Africa and found also in the Cape de Verd Islands and the East Indies.

22. **G. flava,** *DC. Prod.* i. 509. A shrub, more or less densely covered with grey or ferruginous tomentum. Leafstalks tomentose, very short. Stipules minute subulate. Leaves 1–2 in. long, ⅜ in. wide, tapering or rounded at the base, oblong, obtuse, serrate, softly tomentose above, cinereous beneath, 3-costate, feather-veined. Peduncles longer than the leafstalks, 1- or rarely 3-flowered. Pedicels 2-bracteolate, short. Sepals linear. Petals oblong, spathulate. Fruit 1-lobed, pisiform or obscurely 4-lobed, purplish, hirsute.

South Central, *Baines!*
Mozamb. Distr. Tette, Zambesi, *Dr. Kirk!*

Very closely allied to, if not identical with *G. cana*, Sonder, a native of the Cape, as is also the present species.

There is an imperfect specimen, from Dr. Kirk, which I refer, doubtfully, to this species. Its fruits are somewhat 3–4-lobed.

23. **G. pubescens,** *P. de Beauv. Fl. Oware, p.* 76. *t.* 108. A shrub 2–8 ft. high, with numerous tortuous spreading branches; the lower ones sometimes sarmentose; the younger ones covered with soft stelliform down. Petioles ¼–½ in. long, downy. Stipules linear-subulate. Leaves 2–3 in. long, 1–1½ wide, oblong-acuminate, serrate, 3-nerved; venation arcuate, downy or sometimes subglabrous. Flowers numerous, in terminal much-branched cymes. Flower-buds roundish or oblong. Flowers 1–1½ in. across or even more. Sepals linear-oblong, silky externally, white or pink within. Petals pink, lanceolate, shorter than the calyx. Fruit 4-lobed; lobes the size of peas, reddish-brown, slightly hispid.

Upper Guinea. Oware, *P. de Beauvois;* Cape Coast, *Brass!*
Lower Guinea. Angola, *Dr. Welwitsch!*

To this species are referred a number of Dr. Welwitsch's specimens, which show a wide range of variation. In the flowers they correspond well with P. de Beauvois' figure.

24. **G. Forbesii,** *Harv. in Herb. Kew.* A shrub or small tree, more or less densely covered with coarse stelliform hairs. Petioles ¼ in. long. Stipules subulate-lanceolate, longer than the petioles. Leaves 3–4 in. long, 1–2 in. wide, subcordate, oblong, acute or acuminate, irregularly toothed; teeth setose, scabrous above, stellate-tomentose below, 3-costate; venation arcuate. Cymes shortly stalked. Peduncles ½–¾ in. long, dividing above into 3–4 pedicels, which are covered with appressed bristles. Flower-buds oblong, tumid at the base. Sepals linear, 1 in. long. Petals oblong, deeply 2-parted. Ovules 1 or 2 in each cell of the ovary. Fruit the size of a hazel-nut, somewhat 4-lobed; lobes muricate.

Mozamb. Distr. Mozambique, *Forbes!* Rovuma river, *Drs. Meller and Kirk!*

A very distinct species indicated as new by the late Dr. Harvey.

25. **G. pilosa,** *Lam. Dict.* iii. 43; *excl. syn. DC. Prod.* i. 510. A shrub or small tree, sometimes fluted at the base, with numerous, widely spreading, sometimes subscandent, purplish, puberulous or pilose branches, occasionally spiny. Leaves subcoriaceous, 2–4 in. long, 1–1½ in. wide, on

very short pilose stalks, ovate-oblong, subcordate, acute or acuminate, more or less coarsely serrate, pilose on both surfaces, 3-nerved, nearly feather-veined. Stipules subulate-lanceolate, nearly as long as the petioles, deciduous. Peduncles along the sides of the branches, axillary, ½–¾ in. long, dividing into 2–3 pedicels of about the same length. Flower-buds oblong, dilated at the base, constricted in the middle. Sepals oblong, pilose. Petals oblong, emarginate, one-third shorter than the sepals. Anthers usually stellate-pilose on the back, rarely glabrous. Stigmatic lobes linear. Ovary 2-celled, with numerous ovules in each cell. Fruit globose, 1–4-lobed; lobes the size of a pea, pilose.—*G. carpinifolia*, Roxb. Fl. Ind. ii. 587, and Rich. Fl. Abyss. i. 88. nec Juss.

A shrub, widely distributed throughout every district of tropical Africa, and varying much in habit. It occurs also in India, and is distinguished from *G. carpinifolia* by its numerous ovules, etc.

26. **G. parvifolia,** *Hochst. in Rich. Fl. Abyss.* i. 91. A shrub with an angular stem and numerous very slender greyish or purplish villose branches. Leaves on very short villose stalks, oval, subcordate, acute, unequally serrate, stellate-pilose on both surfaces, 3-costate, feather-veined, ½–¾ in. long, ¼–½ in. wide. Stipules subulate. Flowers very small. Sepals downy. Petals roundish, emarginate, shorter than the sepals. Ovary villose. Fruit 4-lobed; lobes small, smooth.

Nile Land. Abyssinia, *Petit!*
Mozamb. Distr. Shigogo, *Dr. Kirk!*
An imperfect specimen from Dr. Kirk in the Kew herbarium is referred with some doubt to this species.

27. **G. ferruginea,** *Hochst. in Rich. Fl. Abyss.* i. 87. A shrub with rugose, spreading, tortuous branches, the younger shoots, as well as the petioles, pedicels, and outer surface of the calyx, densely covered with stelliform ferruginous tomentum. Leafstalks ½ in. long. Stipules minute, awl-shaped. Leaves 1–4 or 5 in. long, 1½–3 in. wide, oblong or elliptic, blunt at the base, acute at the apex, minutely toothed, rough on both surfaces, sometimes subglabrous, 3-costate, secondary veins parallel or scarcely curved. Peduncles axillary and terminal, twice the length of the leafstalks, dividing into 3–6 or even more short pedicels. Flower-buds oblong-ovoid. Flowers 1½–2 in. across. Sepals oblong-lanceolate. Petals lanceolate, shorter than the calyx. Torus furrowed, villose above. Fruit fleshy, subglobose, glabrous, 4-lobed, each lobe the size of a large pea and containing a 1-celled, 1-seeded nut.—*? G. scabrida*, Wall. Cat. 1113.

Upper Guinea. Cape Coast, *Brass!*
Nile Land. Abyssinia, *Schimper! Dr. Roth! Dillon and Petit!*
The species also occurs in India, and is very variable in foliage, hairiness, etc.

28. **G. angolensis,** *Welw. mss.* A shrub or small tree with numerous, intricate, purplish, slightly puberulous branches. Leafstalks ¼ in. long, pilose. Leaves rounded at the base, oblique, oblong, acuminate, finely serrated, nearly smooth, 3-nerved, arcuate-venose, 2–3 in. long, 1–1½ in. wide. Flowers numerous, axillary, arranged chiefly at the ends of the branches. Peduncles downy. Flower-buds subglobose, ultimately oblong,

downy. Flowers 1–1½ in. in diam. Sepals oblong, white on the inner surface. Petals oblong-lanceolate, entire, half the length of the sepals. Anthers glabrous. Ovary densely clothed with very long setæ, 2-celled; ovules 2 in each cell. Fruit the size of a large cherry, 4-lobed; lobes subglobose, copper-coloured, pilose.

Lower Guinea. Angola, *Dr. Welwitsch!*

29. **G. tetragastris,** *R. Br. mss. in Herb. Mus. Brit.* A shrub covered with stelliform hairs. Petiole ½ in. long, hirsute. Stipules subulate-lanceolate, ciliate. Leaves 4–6 in. long, 2–5 in. wide, oblong-lanceolate, rounded or tapering at the base, minutely dentate, slightly pilose above, downy beneath, 3-costate, arcuate-venose. Cymes many-flowered, terminal, and axillary. Peduncles hirsute, 1–1½ in. long, dividing above into 2–3 short pedicels. Flower-buds oblong, obtuse, tumid at the base. Flowers large, 2 in. diam. Sepals oblong, setose, corrugated on the inner surface (always?). Petals half the length of the sepals, lanceolate. Ovary 4-lobed, villose, 4-celled. Drupe the size of a cherry, 4-lobed, pilose.

Upper Guinea. Cape Coast, *Brass!* Abbeokuta, *Irving!*

A very distinct species readily recognised by its large foliage and terminal cymes of large flowers.

30. **G. sulcata,** *Mast.* A large shrub covered in all the younger parts with ferruginous stellate tomentum. Leafstalks ¼ in. long. Leaves 2–4 in. long, 1–2 in. wide, obliquely cordate, oblong, acuminate, crenate-serrate, 3-costate, feather-veined, scabrous above, tomentose below. Inflorescence terminal and axillary. Peduncles about an inch in length, dividing into 3 short pedicels. Flower-buds oblong, tumid at the base, contracted in the centre. Sepals oblong, obtuse, downy externally. Petals oblong-lanceolate, emarginate, glandular at the base, half the length of the sepals. Stamens indefinite, more or less monadelphous, inserted on a prominently 5-lobed torus. Stigma of 5 wedge-shaped lobes.

Mozamb. Distr. Shupanga and Lumbo river, *Dr. Kirk!*

South Central. Desert south of Zambesi, *Chapman and Baines!*

A distinct and handsome species. The specific name applies to the large and deeply-grooved torus.

31. **G. coriacea,** *Mast.* A shrub or small tree with smooth purplish branches. Stipules deciduous. Petioles scarcely an inch in length. Leaves 5–6 in. long, elliptical, acuminate, entire, coriaceous, 3-costate, arcuate-venose, smooth. Flowers numerous, in axillary and terminal, much-branched cymes. Peduncles half the length of the leaves. Pedicels 1 in. long, densely covered, like the common stalk, with close reddish down. Flower-buds oblong, obtuse. Sepals slightly hooded at the apex, pitted on the inner surface. Petals broadly ovate, glandular beneath, much shorter than the sepals. Stamens indefinite, arising from an urceolate 5-lobed, villose torus. Ovary 2–3 ∞-celled, with numerous ovules attached in a double row to the inner angle of each cell. Fruit. . . .

Upper Guinea. Kongui river, lat 1° N., *Mann!*

32. **G. floribunda,** *Mast.* A shrub or small tree with erect or spread-

ing smooth branches. Stipules lanceolate-subulate, ¼ in. long, equalling the slightly pilose leafstalks. Leaves rounded at the base, obovate, oblong-lanceolate, acuminate, undulate, serrate, 3-costate, arcuate-venose, smooth on both surfaces, 2–3 in. long, ¾–1 in. wide. Flowers numerous, in much-branched, terminal, leafless, panicled cymes. Pedicels ¼–½ in. long, as long as the flowers. Involucre of 3 3-fid bracts. Flower-buds oblong-obovoid. Sepals oblong, hooded. Petals half the length of the sepals, glandular at the base; lamina lanceolate, emarginate. Stamens indefinite, on a raised villose torus. Ovary villose, obovoid, 3-celled; ovules numerous. Fruit pyriform, the size of a small cherry, smooth; mesocarp fibrous; nut bony, 4-celled, each cell 1-seeded.

Lower Guinea. Angola, *Dr. Welwitsch!*

33. **G. malacocarpa,** *Mast.* A tree or shrub with puberulous branches. Leafstalks ¼ in. long. Leaves 2–3 in. long, 1–2 in. wide, oval or oblong, acute, entire, smooth, albido-tomentose beneath, 3-costate, arcuate-venose. Stipules deciduous. Flowers numerous, in terminal paniculate cymes. Fruit oblong-obovoid, an inch long, slightly tomentose on the outer surface, fibrous in the interior, 1-celled, 1-seeded. Embryo straight. Albumen horny. Radicle thick, directed to the hilum. Cotyledons leafy, flat, ovate, 3-nerved, arcuate-venose.

Upper Guinea. Quorra and Tschadda, *Barter!*

34. **G. africana,** *Hook. f. Fl. Nigrit.* 237. A shrub with spreading, purplish, puberulous, viscid branches. Stipules subulate. Leaves on short stalks, subcoriaceous, ovate, acuminate, smooth, puberulous beneath, entire or minutely serrate, 3-costate, arcuate-venose, 4–6 in. long, 1–2 in. wide. Flowers apparently numerous, in terminal paniculate cymes. Fruit ¾ in. long, obliquely obovoid, wedge-shaped; mesocarp fibrous, 1-celled, 1-seeded.

Upper Guinea. Sierra Leone, *Don!*
Lower Guinea. Congo, *Smith!*
I have not seen flowers of this species.

35. **G. pinnatifida,** *Mast.* A small tree, the younger branches, petioles, pedicels, stipules, and undersurface of nerves of the leaves, villose. Stipules ¾ in. long, deeply divided into 5–6 linear, ciliated lobes. Petioles villose, shorter than the stipules. Leaves subcordate, oblong-lanceolate, acuminate, 1-costate, arcuate-venose, smooth above and below except along the nerves, which are thinly covered on the under surface with fine bristles. Flowers numerous, in terminal, much-branched, panicled cymes. Pedicels slightly villose, bracteolate; bracteoles stipuliform. Involucre of 3 deciduous, broadly ovate, subcordate, imbricate, foliaceous bracts enclosing 3 flowers. Flower-buds oblong, acute. Sepals downy, slightly hooded at the apex. Petals less than half the length of the sepals, oblong, obtuse, emarginate; unguis glandular; lamina thickened, fleshy, hairy. Stamens ∞, monadelphous below, where they form a tube encircling the base of the ovary. Ovary 2-celled (1-celled by abortion). Style cylindrical; stigma notched; placenta axile; ovules 2 in each cell, attached to the inner angle. Fruit 1¼ in. long, ½ in. wide, pyriform, purplish, 1-celled, 1-seeded; me-

socarp fibrous. Embryo straight in horny albumen; radicle directed to the hilum. Cotyledons flat, ovate, acute.

Upper Guinea. Sierra del Crystal, *Mann !*

4. TRIUMFETTA, Linn.; Benth. et Hook. f. Gen. Pl. i. 234.

Sepals 5, distinct, frequently hooded and provided with a little point at or near the apex. Petals 5, glandular beneath. Stamens 10–25, inserted upon a fleshy, lobed, glandular torus. Ovary 2–5-celled with 2 ovules in each cell. Style filiform; stigma 5-toothed. Capsule small, globose or oblong, echinate or setose, indehiscent or dividing into 3–6 valves. Seeds 1–2 in each cell, pendulous, albuminous; embryo straight. Cotyledons flat, leafy.—Herbs or shrubs more or less covered with stellate hairs. Leaves serrated, entire or lobed. Flowers yellowish, arranged in close cymes which are placed opposite to the leaves, along the sides or at the ends of the branches.

A considerable genus, chiefly tropical. The species are, some of them, widely distributed as weeds in cultivated fields, their bur-like fruits offering facilities for extensive distribution. The duration of the species as well as the degree of hairiness vary with the situation in which the plants grow. The form of the leaves is likewise subject to very great variation, but the characters afforded by the fruits are more constant.

Fruit indehiscent. (Sect. *Lappula.*)
- Stamens 20. Prickles of fruit appressed, covered on all sides with short white hairs . . . . . 1. *T. flavescens.*
- Stamens 5. Prickles appressed with a few short white hairs on the edges and upper surface only . . . . . 2. *T. neglecta.*

Fruit dehiscent. (Sect. *Bartramea.*)
- Flowering stem leafless or nearly so. Flowers appearing before the leaves.
  - Bristles of fruit spine-pointed. Leaves lanceolate . . . . . 3. *T. Welwitschii.*
  - Bristles of fruit tipped with a tuft of fine hair. Leaves roundish, lobed . . . . . 4. *T. geoides.*
- Flowers produced at the same time as the leaves and on the same stems.
  - Prickles terminating in a thickened, well-marked hook.
    - Fruit glabrous or nearly so. Prickles glaucous, not dilated at the base . . . . . 5. *T. annua.*
    - Fruit downy or villose.
      - Fruit small with close white down between the prickles . . 8. *T. rhomboidea.*
      - Fruit large, villose. Prickles shaggy, conical. Flowers nearly an inch long . . . . . 7. *T. pilosa.*
      - Fruit more or less villose. Prickles shaggy, scarcely dilated at the base. Flowers less than half an inch long . . . 6. *T. semitriloba.*
  - Prickles of the fruit straight or nearly so at the apex, smooth or villose at the base.
    - Prickles simple at the points.
      - Stem prostrate, creeping . . . . . 9. *T. glechomoides.*
      - Stem erect.
        - Prickles short, broad at the base . . . . . 12. *T. Heudelotii.*
        - Prickles long, not broad at the base.
          - Prickles black. Lower leaves broad . . . . . 10. *T. tomentosa.*
          - Prickles broad. Leaves narrow . . . . . 11. *T. orthacantha.*
    - Prickles with a tuft of fine hairs at the extremity . . . . 13. *T. setulosa.*

Prickles long, slender, filiform, covered with long spreading setæ.
Stem trailing. Leaves deeply lobed . . . . . 14. *T. Kirkii.*
Stem erect. Leaves oval, entire . . . . . 15. *T. trichocarpa.*

1. **T. flavescens,** *Hochst. in Rich. Fl. Abyss.* i. 82. Shrubby. Stem pilose, studded with black dots. Lower leaves stalked. Stalks as long as the blades, which are roundish, acute, truncate or cordate at the base, irregularly toothed, palmately 5-nerved, tomentose on both surfaces, especially the under. Flowers numerous, in small clusters, arranged along the sides and ends of the branches, forming a long, leafless, raceme-like inflorescence. Sepals linear or oblong, apiculate. Petals oblong, tapering at the base, half the length of the sepals. Stamens 20 or more. Fruit indehiscent, small, oblong, covered with greyish down from amid which emerge numerous small, ciliated, hooked prickles.—*T. Benguelensis,* Wawra et Peyritsch, Sert. Benguel. 19.

Nile Land. Abyssinia, *Schimper!* Soturba, *Schweinfurth!*
Lower Guinea. Benguela, *Wawra and Peyritsch.*
Wawra and Peyritsch's *T. Benguelensis* is only known to me from the description in the work above cited. There is, however, little room for doubt that it belongs to the above species.

2. **T. neglecta,** *Wight and Arnott, Prod. Fl. Ind.* i. 75. Herbaceous, erect, slightly downy, branched. Leafstalks 1–2 in. long. Leaves subcordate, roundish, acuminate or slightly 3–5-lobed, lobes acute, serrate, covered with greyish stelliform hairs on both surfaces. Flowers minute, in lateral, extra-axillary clusters forming elongated racemose cymes. Sepals linear. Petals oblong, obtuse. Stamens 5–8. Fruit oblong, 2–3 lines long, indehiscent, covered with appressed hooked bristles which have hairs on their edges only, not over their whole surface.—*T. pentandra,* Guill. et Perr. Fl. Seneg. i. 93. t. 19. *T. cuneata,* Hochst. in Rich. Fl. Abyss. i. 84.

Nile Land. Abyssinia, *Schimper.*
Occurs also in various parts of India.

3. **T. Welwitschii,** *Mast.* An herbaceous perennial sending up from a woody stock a number of herbaceous shoots 1 2 ft. in height, purplish, roundish or angular, smooth or with a few scattered hairs. Stipules persistent, subulate or falciform, longer than the very short petioles, leaves produced on the same stem as, but subsequently to, the flowers, oblong-lanceolate, acute or obtuse, tapering at the base, nearly entire or serrated, palmately 3-nerved, slightly pilose above, downy beneath, 1–3 in. long, ½–1 in. wide. Flowers numerous, in terminal, much-branched, corymbose cymes. Pedicels downy, longer than the flowers. Flower-buds oblong-clavate. Sepals oblong, hooded, apiculate, longer than the oblong, unguiculate, yellow petals, whose edges are ciliated below. Stamens numerous (20 25), inserted on an elevated thickened torus. Styles consolidated, shorter than the stamens. Ripe fruit the size and form of a small cherry, covered with long, slender, straight, pinkish setæ, which are densely ciliate and tipped by a minute, white, straight or slightly curved point.

Lower Guinea. Angola, *Dr. Welwitsch.*
Mozamb. Distr. Lat. 19° S., *Dr. Kirk,* near Lake Nyassa, *Dr. Kirk!*

A very distinct and singular species, having, as Dr. Welwitsch remarks, more the habit of a species of *Helichrysum* than of a *Triumfetta*. The leaves, according to Dr. Welwitsch, are not produced till after the flowers have fallen, hence, perhaps, the reason why in herbaria leafless specimens are more abundant than those provided with leaves.

4. **T. geoides,** *Welw. mss.* An erect herbaceous plant, giving off from the summit of a woody stock numerous flowering and leafy branches about a foot in height. Leafy shoots appearing after the flowers, cylindrical, clothed with long simple villi. Stipules long, subulate. Leafstalks 1–3 in. long. Leaves polymorphous, more or less cordate, roundish or angular, obscurely lobed, sinuous or irregularly crenate and thickened at the margins, palmately 5–7-nerved, veins very prominent, smooth or sparingly stellate-pilose above, covered with close white down beneath; 2–4 in. long, 1–3 in. wide. Flowering-shoots similar to the preceding and appearing before them, usually leafless and bearing a terminal, many-flowered, much-branched cyme. Ultimate pedicels shorter than the flowers. Flower-buds obovoid, obtuse. Flowers scarcely half an inch long. Sepals violet, oblong, obtuse, downy, apex inflected. Petals golden-yellow, half the length of the sepals, tapering to a ciliated stalk. Stamens 20. Disk ciliate, glandular. Fruit globose, the size of a cherry, 4-valved; valves densely covered with long, slender, pink, setose bristles each tipped with a tuft of fine white hairs.

Lower Guinea. Angola, *Dr. Welwitsch!*

A very curious and distinct species, when in fruit having much the appearance of a species of *Geum*.

5. **T. annua,** *Linn.; DC. Prod.* i. 507. An annual with erect, slightly pilose stems, 1–2 ft. in height. Leaves generally on very long stalks, ovate, acuminate, dentate, 3-nerved, smooth or slightly pilose, 4–5 in. long, 2–4 in. wide. Stipules subulate. Peduncles extra-axillary, 3-flowered, ½ in. long. Flowers 2–3 lines long. Petals bright orange, nearly as long as the apiculate sepals. Stamens 10. Fruit globose, the size of a pea, smooth, covered with glaucous hooked prickles, 4-celled, 4-seeded.—*T. Schimperi*, Hochst. Pl. Schimp. Abyss.

Nile Land. Abyssinia, *Schimper, Quartin Dillon and Petit;* Unyoro, *Speke and Grant!*

Lower Guinea. Angola, *Dr. Welwitsch.*

A plant that varies in size, texture, and hairiness according to the locality in which it is grown. Dr. Welwitsch's specimens have black dots on the stem and are of a more shrubby habit; a hairy line is often visible down one side of the stem. In spite of these and other variations, the species may be readily known by its long leafstalks and fruit smooth between the prickles.

6. **T. semitriloba,** *Linn.; DC. Prod.* i. 507. Suffrutescent or shrubby, pubescent with stellate down or villose, upper surface of the leaves sometimes nearly glabrous. Branches erect or spreading, covered with a very tough bark. Lower leaves on long spreading stalks 1–4 in. long, roundish, subcordate, 3–5-lobed, lobes acute, central one longest, irregularly toothed; 4–6 in. long, 3–4 in. wide; upper leaves smaller, oblong-lanceolate or cordate-ovate, acute. Flowers numerous, in close cymose clusters arranged in long leafy racemes along the sides and ends of the branches. Flower-buds oblong, apiculate. Sepals 5, oblong, apiculate. Petals oblong,

bright yellow. Stamens 10–15. Fruit globose, the size of a large pea, 4–6-valved; valves studded with hooked, pilose prickles.—*T. angulata*, Lam. Dict. iii. 421. *T. cordifolia*, Guill. et Perr. Fl. Seneg. i. 92. t. 18. *T. longiseta*, Guill. et Perr. l. c. i. 92.

Upper Guinea. Fernando Po, *Barter!* Gambia, *Boteler!* Lagos, *Barter!* Abbeokuta, *Irving!* Sierra Leone, *Heudelot!*

Lower Guinea. Angola, *Dr. Welwitsch!*

A widely distributed tropical weed, some of whose varieties approach those of *T. rhomboidea*, but have larger fruit. Guillemin and Perrottet's *T. longiseta* only differs in the length of the prickles, the 6-valved fruit being, as far as I have seen, an exceptional occurrence.

7. **T. pilosa,** *Roth; DC. Prod.* i. 506. Herbaceous or shrubby, 4–5 ft. high, more or less densely covered with yellowish villi. Leaves on short villose stalks, roundish or oblong, subcordate, obscurely 3-lobed, lobes deltoid, acute, irregularly serrate, villose above, densely tomentose below; 4–5 in. long, 3–4 in. wide. Flowers large, nearly 1 in. in length, arranged in terminal clusters. Sepals linear-oblong, apiculate. Petals half the length of the sepals, ciliate at the edge of the claw. Stamens 12. Disk lobed, ciliated at the margins. Fruit globose, the size of a cherry, 4-valved; valves villose, studded with numerous long, shaggy, subulate, hooked prickles.

Nile Land. Abyssinia, *Roth!*

Lower Guinea. Angola, *Dr. Welwitsch!*

The plant occurs also in India, and is variable in the shape of the leaves and in the degree of hairiness. De Candolle erroneously describes it as apetalous, and as having indehiscent fruit.

8. **T. rhomboidea,** *Jacq.; DC. Prod.* i. 507. Herbaceous or shrubby, glabrous, villose, stellate-pilose or velvety. Stalks of lower leaves nearly as long as the blades. Leaves polymorphous, often differing much on the same specimen, ovate, cordate or rhomboid at the base, acute or somewhat 3-lobed at the apex, palmately 3–5–7-nerved, unequally serrate; the lower serratures sometimes reflexed and glandular; surfaces exceedingly variable in regard to degree of pubescence. Flowers numerous, in cymose clusters along the sides and ends of the branches. Pedicels short. Flower-buds oblong or somewhat clavate, apiculate. Sepals hispid or downy, oblong, apiculate. Petals yellow, oblong, tapering at the base. Stamens 10–15. Capsules globose, the size of a small pea, albido-tomentose, 3–5-valved; valves covered with smooth, hooked, conical prickles.—*T. velutina*, Vahl, Symb. iii. 62. *T. glandulosa*, Lam. Dict. iii. 421. *T. trilocularis*, Guill. et Perr. Fl. Seneg. i. 93. *T. Vahlii*, Poir. Dict. Suppl. iii. 300. *T. mollis*, Schum. et Thonn. Pl. Guin. 239. *T. Thonningiana*, DC. Pl. Rar. Gen. 64. *? T. angulata*, Hook. f. in Fl. Nigrit. 235, nec Lam. *T. trilocularis*, Roxb. Fl. Ind., fide Hook. f. in Fl. Nigrit. 235. *T. eriophlebia*, Hook. f. Fl. Nigrit. 235.

Widely distributed throughout tropical Africa, whence specimens have been received from almost every collector. It is also a native of the West Indies, Arabia, East Indies, etc. The plant is excessively variable, now apparently an annual, at other times a rigid branching undershrub. Leaves of almost every possible size, form, and quality of pubescence, now glabrous or nearly so, pilose, hispid, tomentose, sometimes covered with cream-coloured tomentum along the nerves of the leaf principally (*T. eriophlebia*, Hook. f.), at other times densely covered with thick tomentum. Hence it is not to be wondered at

that many supposed distinct species and varieties have been described. The extensive series of specimens at Kew, and especially the copious illustrations particularly selected by Dr. Welwitsch to show the amount of variation, amply suffice to show that these so-called species merge one into the other, as even on the same plant characters belonging to two or three of the established varieties may be met with. Dr. Welwitsch's testimony on this point is emphatic.

The most constant character, and one that runs through almost all the varieties, resides in the small, globular, whitish-tomentose fruit, which is covered with comparatively stout hooked bristles; the white tomentum, however, is not always to be seen on the mature capsules. One variety is stated to have clove-scented flowers.

9. **T. glechomoides,** *Welw. mss.* A trailing herbaceous plant, giving off numerous prostrate, slender, elongated, pilose branches, from a perennial woody stock. Leafstalks short. Stipules subulate, ciliate. Leaves 1–3 in. long, 1–1½ in. wide, subcordate, ovate, acute, irregularly crenate-serrate, palmately 3 7-nerved, with a few stellate hairs above and studded with rather coarse bristles along the nerves, coarsely stellate-pilose beneath. Flowers numerous, in cymose clusters, placed at the extremities of the branches, in leafless raceme-like groups. Pedicels shorter than the flowers. Flower-buds oblong, apiculate. Flowers ½ in. and upwards in length. Sepals linear, apiculate, violet. Petals oblong, tapering at the base; the margins ciliate below, shorter than the sepals. Stamens 10. Fruit globose, the size of a small pea, 4-valved; valves glabrous or nearly so, studded with short, stout, conical, nearly smooth prickles, terminated by a fine white, bent, scarcely hooked point.

Lower Guinea. Angola, *Dr. Welwitsch!*

10. **T. tomentosa,** *Bojer in Ann. Sc. Nat. Sér.* 2. xx. 103. A shrub, more or less densely covered with down, especially so along the petioles and under surface of the leaves. Leafstalks 1–2 in. long. Stipules lanceolate. Leaves cordate or tapering at the base, oblong or ovate, sometimes 3-lobed at the apex, lobes triangular, irregularly dentate; 3–5 in. long, 2–3 in. wide. Flowers numerous, arranged in small clusters opposite the leaves, along the sides or at the ends of the branches. Pedicels ½–1 in. in length. Flower-buds oblong, obtuse, scarcely apiculate. Sepals oblong. Petals roundish, stalked, yellow, ciliate at the margins below. Stamens 10, 5 long, 5 short when in the bud, ultimately equal. Disk lobed, ciliate. Fruit the size of a cherry, globular, covered with long, straight, black bristles slightly ciliate below. Capsule 4-valved, 4-seeded.

Mozamb. Distr. Zanzibar, Mombasa, *Bojer!*

A shrub, generally about 5–6 ft. in height, cultivated in Mauritius and found wild also in Madagascar and in India. It is nearly allied to, if indeed it be not the same plant as *T. ovata,* DC. Prod. i. 567.

11. **T. orthacantha,** *Welw. mss.* An erect shrub with spreading pilose branches. Leafstalks very short, dilated upwards. Leaves 3–4 in. long, 1–1½ in. wide, lanceolate, irregularly toothed, rough with simple hairs above, densely stellate-pilose below. Flowers in small extra-axillary clusters along the sides of the branches, forming an elongated, interrupted, leafless raceme. Flower-buds oblong, apiculate, longer than the pedicels. Flowers less than ½ in. long. Sepals linear-oblong, apiculate. Petals oblong, shorter than the

sepals, ciliated below. Stamens 12. Fruit globose, the size of a pea, 4-valved; valves densely covered with straight, setose, brown prickles, terminated by a white, bent, scarcely hooked point.

Upper Guinea. Nupe, Niger, *Barter!*
Lower Guinea. Angola, *Dr. Welwitsch!*

12. **T. Heudelotii,** *Planch. mss. in Herb. Kew.* Herbaceous or suffrutescent. Stem rough, with black dots, villose. Leaves on short stalks, oblong, acuminate, irregularly toothed, palmately 3-nerved, obscurely 3-lobed at the apex, downy beneath. Pedicels longer than the petioles. Flowers . . . Fruit globose, the size of a large pea, 4-valved, covered with black, conical, sparingly ciliated prickles, which are tipped with a slender, straight, white spine or sometimes slightly hooked.

Upper Guinea. Senegambia, *Heudelot!*

13. **T. setulosa,** *Mast.* Annual or suffrutescent, 1–2 ft. high, erect, covered with rough stelliform hairs, branched from the base. Branches elongate; lower ones decumbent. Leafstalks ¼–1 in. long. Leaves 2–3 in. long, 1 in. wide, lanceolate, dentate, palmately 3-nerved, rough, with long simple hairs above, below densely clothed with white down, interspersed with short stelliform bristles. Stipules setaceous. Flowers in small extra-axillary clusters, subsessile along the sides of the leafy branches. Flower-buds oblong. Flowers about ⅓ in. in length. Sepals linear, apiculate. Petals oblong, tapering at the base. Stamens 12. Disk lobed, ciliated at the margins. Fruit globose, the size of a large pea, 4-valved; valves glabrous or nearly so, studded with long spreading subulate prickles, each terminated by a tuft of minute white hairs.

Lower Guinea. Pungo Andongo, Angola, *Dr. Welwitsch!*

14. **T. Kirkii,** *Mast.* An annual plant, with slender, filiform, trailing (?), dichotomously branched stems, covered with thin star-shaped hairs. Leafstalks as long as the leaves, which are cordate, roundish, ½–1½ in. long, ¼–1 in. wide, deeply divided into 3–5 lobes; the latter are oblong, obtuse, crenate, hairy on both surfaces. Flower-stalks terminal, extra-axillary, as long as or longer than the leafstalks, dividing above into 2 or 3 short pedicels. Fruit globular, of the size of a small cherry, densely clothed with long, slender, straight-pointed, ciliate setæ. Fruit 6-celled, 6-seeded.

Mozamb. Distr. Rovuma river, *Dr. Kirk!*

From the dried specimens this would appear to be a trailing plant, whose annual branches spring probably from a woody stock. It is distinguished by its leaves and its fruits.

15. **T. trichocarpa,** *Hochst. in Rich. Fl. Abyss.* i. 84. Annual, with a simple or slightly-branched stem, traversed by a line of hairs along one side. Leaves thin, 2–4 in. long, 1–3 in. wide, oval or elliptic, coarsely serrate, 3–5-nerved, slightly hairy. Leafstalks as long as the blades. Pedicels 3-flowered, extra-axillary or terminal. Flowers minute. Sepals oblong, twice the length of the spathulate petals. Stamens 10–12. Fruit globose, the size of a small cherry, as long as or longer than the pedicels, covered with numerous, soft, ciliate, hooked setæ.

Nile Land. Abyssinia, *Schimper!*

This species has the precedence over one described under the same name, by Sonder, in the Linnæa, which, however, is different from the present one.

In addition to the above, Garcke in Pet. Mossamb. Bot. p. 134, cites, doubtfully, *T. angulata*, Lam. Dict. iii. 421, as a native of Querimba, but he properly adds that Lamarck's diagnosis is quite insufficient to determine the plant intended.

5. HONCKENYA, Willd.; Benth. et Hook. f. Gen. Pl. i. 235.

Calyx of 4 5 sepals. Petals 4–5, glandless at the base. Stamens ∞, free, inserted on a contracted torus; the outer ones numerous, filiform, antherless; the inner 8–10, bearing linear 2-celled anthers; cells distinct. Ovary 4–8-celled, with numerous ovules in each cell. Style filiform; stigma denticulate. Capsule oblong, loculicidally 4–8-valved; valves covered with prickles, transversely septate in the interior. Seeds numerous, horizontal, obovoid, compressed; albumen fleshy. Cotyledons flat, thick.—A tree, covered with stellate pubescence. Leaves lobed. Flowers large, showy, in terminal racemes.

A genus, consisting, so far as is at present known, of a single tropical W. African species.

1. **H. ficifolia,** *Willd.; DC. Prod.* i. 506. A shrub, with purplish branches, covered with fulvous stelliform hairs. Stipules leafy, subulate-lanceolate. Leafstalks shorter than the leaves, which are cordate, roundish or oblong, usually more or less deeply 3 7-lobed; lobes rather obtuse, toothed, stellately pilose above, densely tomentose below; central one longest. Flowers large, showy, and numerous, arranged in terminal racemose cymes, each subtended by an oblong-lanceolate bract and supported on a densely tomentose, jointed pedicel. Sepals 3–5, oblong, tomentose, glandular at the tip, 1 in. or more in length. Petals roundish, stalked, violet, 1–2 in. long. Stamens indefinite, slightly coherent below, 12 longer than the rest and bearing elongate 2-fid anthers, the remainder sterile, filiform, half the length of the petals. Ovary 4–8-celled, with numerous ovules in each cell. Style filiform, 1–2 in. long. Stigmas recurved. Capsule 1–2 in. or more in length, oblong, obtuse, loculicidally 4-valved; valves slightly tomentose, covered with numerous, spreading, ciliated bristles, each terminated by a small white, bent, deciduous point.—*Clappertonia ficifolia,* Decaisne in Deless. Ic. v. t. i.

Upper Guinea. Sierra Leone, *Afzelius! Don!* Senegambia, *Heudelot!* Nupe, *Barter!* Bassa, *Vogel!* Camaroons river, *Mann!*

Lower Guinea. Congo, *Smith!*

A very handsome-flowered shrub; the leaves of which appear to be variable in form.

A specimen in the British Museum, from Afzelius, may possibly belong to a second species, or more probably it is only a variety of the above, it has small whip-like branches, leaves not exceeding 1 in. in length, and oblong fruit 1–1½ in. long.

6. SPARMANNIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 235.

Calyx of 4 sepals. Petals 4, naked at the base (not glandular). Stamens ∞, free, on a short torus; outer ones monoliform; sterile inner ones bearing

ovoid or roundish anthers. Ovary more or less 4-celled, with numerous ovules in each cell. Style simple. Stigma denticulate. Capsule globose, loculicidally 4-valved; valves covered with rigid prickles. Seeds numerous, obovoid. Albumen fleshy. Embryo folded or nearly straight. Cotyledons cordate roundish, flat.—A shrub, more or less pubescent or villose. Leaves palmately lobed. Flowers in terminal umbels, surrounded at the base by small bracts. Flowers conspicuous, white.

The only tropical African species is from Abyssinia: the other two members of the genus are both S. African.

1. **S. abyssinica**, *Hochst. in Rich. Fl. Abyss.* i. 79. *t.* 20. A shrub, whose branches are sparingly covered with slender villi, interspersed among scanty stelliform hairs. Stipules linear-lanceolate, very acute. Petioles shorter than the leaves, which are 2–5 in. long, 2–3 in. wide, cordate palmately 3–5-lobed, central lobe much longest, all covered on both surfaces with shaggy villi, inciso-dentate at the margins. Umbels stalked, 8–12-rayed, opposite the leaves. Involucre of 3–6 lanceolate bracts, sometimes more or less coherent. Flower-buds obovoid. Flowers nearly 1 in. in length. Sepals lanceolate, villose, longer than the somewhat stalked, roundish, pale, violet-coloured petals. Capsule 1 in. or more in length, equalling the pedicel, oblong, obtuse, loculicidally 4-valved; valves downy, studded with straight stellately pilose bristles.

Nile Land. Abyssinia, *Schimper! Dillon and Petit! Roth!*

This species, not known out of Abyssinia, seems to be in some respects intermediate between the two S. African species *S. africana* and *S. palmata*.

7. CORCHORUS, Linn.; Benth. et Hook. f. Gen. Pl. i. 235.

Calyx of 4 or 5 sepals. Corolla of 4 or 5 glandless petals. Stamens indefinite or rarely twice the number of the sepals, free, inserted on a contracted torus. Ovary 2 5-celled. Style short. Stigma somewhat cup-shaped. Capsule elongated, slender or subglobose, smooth or prickly, loculicidally 2–5-valved, internally sometimes transversely septate. Seeds numerous, pendulous or horizontal, albuminous. Embryo generally curved. Cotyledons leafy.—Herbs or undershrubs, more or less covered with stelliform pubescence. Leaves serrated. Flowerstalks very thick, short, axillary or opposite to the leaves, 1–2-flowered, bracteate. Flowers small, yellow.

A genus, comprising nearly 40 species, widely diffused through the tropics, a few being peculiar to Australia and tropical America.

Annuals or biennials, glabrous or slightly pilose.
Capsules 3–6-valved, 3–6-celled, beaked; beak erect, simple.
Pods slender, more than 1 in. in length.
Beak long . . . . . 1. *C. olitorius.*
Beak short . . . . . 2. *C. tridocularis.*
Pods slender, rarely exceeding 1 in. in length.
Pods on very long slender stalks . . . . . 3. *C. longipedunculatus.*
Pods on short stalks.
Pods muricate . . . . . 4. *C. muricatus.*
Pods smooth or pilose, not muricate.

Stem herbaceous, erect . . . . . 5. *C. urticifolius.*
Stem prostrate.
Leaves oblong, 1–2 in. long . . . . . 6. *C. fascicularis.*
Leaves roundish, very small . . . . . 7. *C. Antichorus.*
Capsule 3–6-valved, beaked. Beak divided, spreading horizontally.
Capsule short, stout, winged . . . . . 8. *C. acutangulus.*
Capsule long, slender, wingless . . . . . 9. *C. tridens.*
Shrubby tomentose . . . . . 10. *C. hirsutus.*

1. **C. olitorius,** *Linn.; DC. Prod.* i. 405. Annual or suffrutescent, with erect, branching, nearly glabrous stem. Leafstalks 1–2 in. long, pilose. Stipules setaceous, half the length of the petioles. Leaves 2–4 in. long, 1–2 in. wide, ovate-lanceolate, 3–5-nerved, smooth, serrate; the two lowermost serratures prolonged into long setaceous appendages. Pedicels 2 3-flowered, erect, shorter than the petioles. Sepals sharply pointed, shorter than the spathulate yellow petals. Pod cylindrical, appressed, straight or slightly curved, 1–3 in. long, 10-ribbed, 5-valved, each valve ending in a long point, the whole forming a long, straight, undivided beak to the fruit; inner surface of the valves transversely septate and pitted to receive the numerous blackish seeds.—*C. longicarpus,* Don, Gen. Syst. i. 543. *C. lanceolatus,* Don, l. c.

Wild, or cultivated as a potherb in every part of tropical Africa, and also widely diffused throughout the tropics, extending even into Australia. It varies considerably in stature, form of leaf, hairiness, etc. The valuable fibre, known as Jute, is derived from this and allied species.

2. **C. trilocularis,** *Linn.; DC. Prod.* i. 504. Annual or sometimes perennial (?), with numerous, erect or decumbent, purplish, smooth or pilose, branching stems. Leaves elliptic, oblong or oblong-lanceolate, 1–3 in. long, ½–1 in. wide, crenate-serrate, either with or without basal lobes. Petioles very short, pilose. Stipules setaceous. Pedicels very short, 2 3-flowered. Petals spathulate, bright yellow. Pods 2–3 in. long, erect, straight or curved, slender, 3–4-angled, 3 4-valved; valves scabrous, deeply pitted on the inner surface and ending in a short straight point. Seeds numerous.—*C. fruticulosus,* Visiani ex Walp. Rep. i. 354. *C. serræfolius,* DC. Prod. i. 504. *C. triflorus,* Bojer, ex Walp. Rep. v. 117.

Nile Land. Abyssinia, *Dillon and Petit!* Unyoro, *Speke and Grant!*
Lower Guinea. Angola, *Dr. Welwitsch!*
South Central, *Baines!*
Mozamb. Distr. Senna, Zambesi, *Peters!*

3. **C. longipedunculatus,** *Mast.* An annual, 1–2 ft. high, giving off, from near the base of the stem, numerous, elongated, slender, decumbent or erect, nearly smooth branches. Leafstalks very slender, ¼ in. in length. Stipules subulate, setaceous, shorter than the leafstalk. Leaves 1–3 in. long, ¼–½ in. wide, linear, acute, at both ends, 1-costate, denticulate. Pedicels hair-like, nearly as long as the leaves to which they are opposite, 1 3-flowered. Sepals subulate, setaceous. Petals spathulate below. Pod erect, 1–2 in. long, straight, linear, triquetrous, beaked, tapering at the base, 3-

valved; valves smooth outside, pitted on the inner surface, acuminate. Seeds numerous.

Mozamb. Distr. Zambesi, opposite Senna, and lat. 14–19° S., *Dr. Kirk!*

The very long slender peduncles and the pods tapering below, suffice to distinguish this species.

4. **C. muricatus,** *Hochst. in Rich. Fl. Abyss.* i. 81 (*nec Schum. et Thonn.*). An annual, with erect branching stem, marked on one side by a line of white hairs. Leaves on short pilose stalks, 1–2 in. long, ¼–⅓ in. wide, lanceolate, obtuse at the base and apex, 3-nerved, slightly pilose, serrate at the margins. Stipules linear, very acute. Flowers very small, single or in pairs on short extra-axillary stalks. Capsules short, 1 in. long, slender, curved or erect, 3-sided; angles muricate, 3-celled, 3-valved; valves obtuse or scarcely beaked.

Nile Land. Abyssinia, *Schimper!*

5. **C. urticifolius,** *Wight et Arn. Prod. Fl. Pen. Ind.* i. 73. An erect, slightly branched annual, about a foot in height, more or less pilose. Leaves submembranous, stalked, cordate, oval or elliptic, acute, serrate, smooth or slightly pilose. Stipules linear, setaceous. Peduncles 2 3-flowered, extra-axillary. Capsules terete or slightly 3-sided, pilose, beaked, 1 in. or more in length, 3-celled, 3-valved; valves slightly pilose, acuminate, transversely septate in the interior. Seeds numerous.—*C. quinquenervis,* Hochst. in Rich. Fl. Abyss. i. 81.

Nile Land. Abyssinia, *Schimper!*

This plant is also a native of India, and is closely allied to *C. trilocularis,* from which it differs principally in the pod, which is much shorter than in that species.

6. **C. fascicularis,** *DC. Prod.* i. 505. Annual or sometimes perennial, with procumbent or ascending subglabrous branches, about 1 ft. in length. Leaves on short stalks, oblong or lanceolate, 1–2 in. long, ¼–½ in. wide, 3-costate, subglabrous, serrated. Peduncles extra-axillary, 2–5-flowered. Sepals 1 line long. Stamens 5 10. Capsules nearly cylindrical, shortly beaked, ½–¾ in. long, straight or curved, subpubescent, 3-celled, 3-valved; valves acuminate, smooth or slightly pilose outside, scarcely septate within. —*C. brachycarpos,* Guill. et Perr. Fl. Senegamb. i. 89.

Upper Guinea. Senegambia, *Heudelot! Perrottet!*
Nile Land. Sennar, *Kotschy!*
Lower Guinea. Angola, *Dr. Welwitsch!*
Mozamb. Distr., *Dr. Kirk!*
Occurs also in Bengal and Australia.

7. **C. Antichorus,** *Raeuschel, Nomen. Bot. ed.* iii. 158. A woody perennial with a thick woody stock, from whose summit radiate thick, tortuous, intricately divided, prostrate branches, 6 7 in. long. Leaves small, ½ ¾ in. long, shortly petiolate, roundish, plicate-crenate, serrate, palmately 3-nerved, slightly tomentose. Flowers solitary or in pairs, on short stout pedicels. Capsules long (1 1½ in.), slender, siliquiform, straight or deflexed, beaked at the apex, 4-valved.—*Antichorus depressus,* Linn. Mant. ex DC. Prod. i. 504. *Corchorus microphyllus,* Fresen. in Mus. Senck. ii. 156.

Nile Land. Abyssinia, Nubia, Kordofan, Sennar, *Kotschy!* lat. 16° N., *Speke and Grant!*

Lower Guinea. Angola, *Dr. Welwitsch!*

A very characteristic plant of the dry arid soils in which it grows. Specimens exist in the herbarium from Scinde, Aden, Arabia, Muscat, Northern Africa, the Cape Verde Islands, etc. Its pods at first sight might readily be mistaken for those of an *Epilobium*.

8. **C. acutangulus,** *Lam.; DC. Prod.* i. 505. Annual or perennial with an erect or prostrate, branching, pilose stem. Leafstalks pilose, about an inch in length. Stipules subulate, setaceous. Leaves 1–3 in. long, ½–1½ in. wide, ovate acute or oblong-lanceolate, rounded at the base, serrate, 2 basal serratures sometimes prolonged into long setaceous lobes, 3-nerved; nerves often pilose. Pedicels opposite the leaves or axillary, 2–3-flowered, very short. Flowers frequently apetalous. Capsules erect, 1–1½ in. long, prismatic, straight, glabrous, provided with 3 membranous wings and terminating in 3–5 horizontal entire or 2-fid points. Inner surface of valves scarcely pitted. Seeds numerous.—*C. polygonus*, Schum. et Thonn. Pl. Guin. 245. *C. procumbens*, Boj. ex Walp. Rep. v. 117. *C. alatus*, Don, Gen. Syst. i. 542. *C. muricatus*, Schum. et Thonn. Pl. Guin. 246.

Widely distributed throughout the whole of tropical Africa and found also in the East and West Indies and Australia. It is variable in habit, foliage, etc. Some of Dr. Welwitsch's specimens are remarkable for the variable number of petals, in some cases even the petals are entirely absent. Dr. Welwitsch states that he has found on the same specimen variations of this nature.

9. **C. tridens,** *Linn.; DC. Prod.* i. 505. An annual with an erect or prostrate, pilose or smooth, branching stem. Leafstalks ½–1 in. long, pilose. Stipules setaceous. Leaves 1–3 in. long, 1 in. wide, oblong-acuminate or linear, serrate, with or without basal appendages. Peduncles 1–3-flowered. Pods erect, slender, straight or curved, cylindrical, smooth or striated, 1–2 in. long, 2–3-valved; valves scarcely pitted on the inner surface and terminating in a horizontal point, so that the fruit is terminated by 3 short spreading horns. Seeds numerous.—*C. angustifolius*, Schum. et Thonn. Pl. Guin. 244.

Upper Guinea. Senegambia, *Perrottet!* Niger, *Barter!*
Nile Land. Abyssinia, *Schimper!*
Lower Guinea. Angola, *Dr. Welwitsch!*
Mozamb. Distr. Tette, *Dr. Kirk!* Mozambique and Zambesi, *Peters!*
Found also in India and Australia.

Variable in habit and foliage. The young tops, according to Dr. Welwitsch, are cooked with Palm-oil and used as Spinach by the natives.

10. **C. hirsutus,** *Linn.; DC. Prod.* i. 505. An erect branching undershrub, 2–3 ft. high, covered with soft stelliform pubescence. Leaves on short stalks, subcordate oval oblong or lanceolate, frequently obtuse, rather thick, plicate when young, rugose, scabrous above, tomentose below, 2–3 in. long, ¼–1 in. wide. Peduncles by the side of the leafstalks and nearly of the same length, bearing 2–6 or more very short clustered pedicels. Flower-buds oblong, apiculate. Calyx tomentose, villose, 2–3 lines long. Sepals setaceous. Petals narrow, yellow. Stamens ∞, on a short torus. Ovary 4-celled. Capsule slender, ¾–1 in. long, tuberculate; tubercles covered with

stelliform pubescence, 2–4-celled, 2–4-valved; valves transversely septate on the inner surface and terminated by a short straight beak. Seeds numerous. *C. sidoides*, F. Muell. Frag. iii. 9; Benth. Fl. Aust. i. 278.

Mozamb. Distr. Tette, Zambesi, *Dr. Kirk!*
A very distinct species, found in the West Indies, near the coast, also in Australia.

8. **ANCISTROCARPUS,** Oliver; Journ. Linn. Soc. ix. 173; Benth. et Hook. f. Gen. Pl. i. 986.

Sepals 4, distinct. Petals 4, shorter than the sepals, glandless at the base. Stamens indefinite, hypogynous, all fertile, united into 4 phalanges opposite to the petals. Anthers linear. Ovary more or less 6-celled; ovules numerous in each cell, more or less parietal in their attachment owing to the imperfection of the dissepiments. Style elongated, simple, slender; stigma obtuse. Fruit globose, coriaceous, loculicidally 3-valved (?); valves covered with prickles. Seeds numerous.—Shrubs or small trees. Leaves smooth, oblong, entire. Flowers white, in lateral or terminal umbellate cymes.

The only species of this genus at present known are from Western tropical Africa.

Fruit an inch or more in diameter, covered with long hooked spines . 1. *A. densispinosus.*
Fruit less than an inch in diameter. Spines short straight or scarcely hooked . . . . . 2. *A. brevispinosus.*

1. **A. densispinosus,** *Oliv.; Journ. Linn. Soc.* ix. 174. A small tree, 15 ft. in height. Leaves on short stalks, oblong-lanceolate, acuminate, denticulate, unicostate, arcuate-venose, smooth or slightly stellate-tomentose, especially along the nerves, 6–8 in. long, 2–3 in. wide. Cymes terminal, many-flowered; pedicels 4–6 lines long. Flowers white or yellow, 1–1¼ in. diam. Sepals linear, longer than the petals. Filaments monadelphous below, dividing above into 4 bundles, filaments all antheriferous, equalling the petals. Style filiform, longer than the stamens; stigmas obtuse. Ovary hirsute, 6-celled; cells many-ovuled. Fruit globose, the size of a walnut, densely covered with long, stout, hooked, ciliated prickles.

Upper Guinea. Camaroons mountain, *Mann!* Niger, *Barter!*

2. **A. brevispinosus,** *Oliv. l. c.* Shrub or small tree. Leafstalks ¼–½ in. long. Leaves subcordate, oblong-acuminate, 3–4 in. long, 2 in. wide, denticulate, 3-costate, arcuate-venose, glabrous or slightly stellate-pilose along the nerves. Stipules subulate, covered with rusty tomentum, deciduous. Sepals 4, linear. Petals 4, ovate, undulate. Styles consolidated. Fruit globose, the size of a small chestnut, coriaceous, covered with short straight spines.

Upper Guinea. Niger, *Barter!*

9. **DUBOSCIA,** Bocquillon in Adansonia, vii. 50; Benth. et Hook. f. Gen. Pl. i. 985.

Flowers within an involucre of 3 valvate bracts. Flowers regular, hermaphrodite. Calyx of 5 valvate, oblong sepals. Petals 5, thick, subulate. Stamens indefinite, all fertile, springing from a thick, fleshy, villose disk;

inner filaments longest. Anthers adnate, subglobose, bilocular, dehiscing longitudinally. Ovary villose, 8-celled. Style as long as or longer than the stamens; stigma fimbriate. Ovules numerous, anatropal, attached in two rows to the inner angle of each cell of the ovary. Fruit indehiscent. Seeds numerous, imbedded in fibrous tissue.—Tree with alternate entire leaves. Stipules entire. Inflorescence in axillary cymes. Flowers involucrate.

1. **D. macrocarpa,** *Bocquillon in Adansonia*, vii. 50. A tree, 30 ft. in height. Branches smooth, purplish; younger ones stellately pilose. Leaf-stalks ¼–½ in. Stipules subulate. Leaves obliquely subcordate, oblong, acuminate, denticulate, 3-costate, arcuate-venose, smooth above, whitish-tomentose beneath, with stelliform hairs along the nerves. Cymes many-flowered, on stout peduncles opposite the leaves; pedicels short. Involucral bracts 3, broadly ovate, acute, foliaceous, imbricate, enclosing 3 flowers. Flower-buds oblong. Sepals oblong, downy, scarcely hooded. Petals very small, subulate, thick. Stamens indefinite, all fertile, free, inserted within a lobed, villose, fleshy disk. Anthers subglobose. Ovary oblong, villose, 7–8-celled. Style cylindrical, as long as the stamens; stigma notched. Ovules numerous, attached in two rows to the inner angle of each cell of the ovary. Fruit 2–3 in. long, 1–2 in. wide, oblong, obtuse, 8-angular, deeply furrowed, downy externally; mesocarp fibrous. Seeds. . . .

Upper Guinea. Muni river, lat. 1° N., *Mann!*

10. **DESPLATZIA,** Bocquillon in Adansonia, vii. 51; Benth. et Hook. f. Gen. Pl. i. 985.

Flowers regular, hermaphrodite, pentamerous. Sepals valvate or induplicate. Petals 5, unguiculate; unguis glandular. Stamens indefinite, monadelphous at the base. Anthers didymous, subglobose, dehiscing longitudinally. Ovary villose, 5-lobed. Style cylindrical. Stigma fringed. Ovules numerous, anatropal, attached in two rows to the inner angle of each cell of the ovary. Fruit large, oblong, indehiscent, externally coriaceous, fibrous within. Seeds winged, imbedded in fibrous tissue.—A tree with entire leaves and palmatifid stipules; the flowers are exinvolucrate in axillary cymes.

1. **D. subericarpa,** *Bocquillon, l. c.* A small tree, with puberulous, spreading branches. Leafstalks 1 in. long. Leaves obliquely subcordate, oblong-acuminate, spinulose-dentate, 3-nerved, arcuate-veined or nearly parallel-veined, smooth or puberulous along the nerves, 4–6 in. long, 2–3 in. wide. Stipules deeply divided into 5–6 linear, ciliated lobes, half the length of the petiole. Flowers numerous in axillary and terminal cymes; pedicels puberulous; bractlets stipuliform. Flower-buds oblong obtuse. Sepals oblong, hooded, downy externally; margins induplicate, petaloid, undulated. Petals one-fourth the length of the sepals, oblong-obovate, slightly glandular beneath, ciliated at the base externally. Stamens indefinite, united below into a membranous tube surrounding the ovary. Ovary oblong, villose, 4–5-celled, surmounted by a cylindrical style as long as the stamens. Stigma fimbriate. Ovules numerous, attached in two vertical

rows to the inner angle of each cell of the ovary. Fruit oblong, obtuse, 3–4 in. long, 2–3 in. wide, indehiscent, coriaceous, brownish and smooth externally, with a thick fibrous mesocarp. Seeds numerous, oblong, winged.

Upper Guinea. Gaboon, *Mann!* River Muni, *Mann!*

11. GLYPHÆA, Hook. f.; Benth. et Hook. f. Gen. Pl. i. 237.

Sepals 5. Petals 5, glandless. Stamens numerous, all fertile. Anthers linear, adnate, 2-celled, dehiscing by terminal pores and surmounted by a small crest prolonged from the connective. Ovary 8–10-celled, with numerous ovules in each cell. Style short. Stigma obtuse. Fruit oblong, fusiform, sulcate, indehiscent; mesocarp fibrous; endocarp pitted to receive the numerous roundish, compressed seeds. Albumen fleshy; cotyledons cordate, roundish.—Shrubs. Leaves oblong, finely toothed. Cymes terminal or lateral. Flowers conspicuous, yellow.

A genus, confined, so far as is at present known, to tropical Africa.

Leaves thin, slightly pilose.
Fruiting pedicels slender . . . . . 1. *G. grewioides.*
Leaves thick, tomentose.
Fruiting pedicels thick, woody. . . . . 2. *G. tomentosa.*

1. **G. grewioides,** *Hook. f. Fl. Nigrit. p.* 238. *t.* 22. A loosely-branching, slightly pilose shrub, 8–12 ft. high. Branches sometimes sarmentose. Leafstalks 1–1½ in. long. Leaves thin, subcordate, ovate or oblong, acuminate, irregularly toothed, 3-nerved, smooth above, sparingly stellate-pilose below. Flowers in terminal cymes. Pedicels longer than the flowers, the latter ¾–1¼ in. diam. Sepals oblong, downy. Petals obtuse, bright yellow. Anthers entire or sometimes with 2 basal points. Fruitstalk 1 2 in. long, slender. Fruit oblong acute or fusiform, sulcate, coriaceous, 1 2 in. long, ¾ in. diam.—*Grewia lateriflora*, Don, Gen. Syst. i. p. 549. *Glyphæa Monteiroi*, Hook. f. Bot. Mag. t. 5610.

Upper Guinea. Fernando Po, *T. Vogel! Mann!* Sierra Leone, *Barter!*
Lower Guinea. Angola, *Dr. Welwitsch!*

Very variable as to the size and shape of the leaves and also as to the size of the flowers. The presence of two small processes at the base of the anther-lobes, relied on to distinguish *G. Monteiroi*, is too inconstant for specific purposes, the divergence of the lower ends of the anther-lobes being probably dependent on order of development, etc. At any rate, on the same specimen and in the same flower, stamens may be seen in which the anthers are 2-apiculate, and others in which they are confluent with the filament. The size of the flowers is so variable as to form no distinctive character. Dr. Welwitsch states that the shrub flowers two or three times in each year.

2. **G. tomentosa,** *Mast.* A shrub; young shoots densely covered with rusty stellate tomentum. Leafstalks about an inch in length. Stipules subulate. Leaves subcoriaceous, slightly oblique at the base, oblong, acuminate, irregularly dentate, 3-costate, villose above, stellate-tomentose below, 2–4 in. long, 1–2 in. wide. Flowers large, showy, 1 2 in. across, arranged in terminal many-flowered cymes. Sepals linear-oblong. Anthers slightly

2-apiculate at the base. Fruiting pedicels thick, woody, as long as the oblong, fusiform, deeply sulcate fruit, which is 2–3 in. long, ¾ in. in diam.

Mozamb. Distr. Shupanga, *Dr. Meller!* Moramballa, *Waller!*

Differs from *G. grewioides* in being more tomentose, having larger flowers and much thicker fruiting pedicels.

Order XXVIII. LINEÆ (by Prof. Oliver).

Flowers regular, hermaphrodite, usually pentamerous. Sepals 4–5, free or connate below, generally imbricate. Petals as many, imbricate, often contorted, fugacious or rigid and persistent. Stamens 5 with or without intervening staminodia, or 10, united at the base in a tube or ring (4 in *Radiola*); anthers 2-celled, dehiscing longitudinally, unappendaged. Ovary free, 3–5-celled. Ovules solitary or geminate, pendulous. Styles 3–5, free or more or less connate. Fruit a capsule, dehiscing septicidally, or drupaceous, 1–several-seeded. Seeds with or without albumen.—Herbs shrubs or trees, usually glabrous. Leaves alternate, rarely opposite, simple, entire or nearly so. Stipules lateral, intrapetiolar, or 0.

A rather small but widely-dispersed Family; the woody species affecting tropical countries. Two of the following genera are endemic.

Flowers 4-merous (minute). Sepals 3-dentate. (*Low herb*) . . .	1. Radiola.
Flowers 5-merous. Petals contorted, unappendaged, fugacious.	
Stamens 5. Fruit a capsule. (*Herbs*)	2. Linum.
Stamens 10. Fruit a drupe. (*Climbers*)	3. Hugonia.
Flowers 5-merous. Petals contorted, unappendaged, more or less rigid, persistent. (*Shrubs or trees*)	4. Phyllocosmus.
Leaves alternate. Petals imbricate, with transverse appendix on the inner face. (*Shrubs or trees*)	5. Erythroxylon.
Leaves opposite. Petals narrow-oval, with thickened costa. (*Shrub*).	6. Aneulophus.

1. RADIOLA, Gmel.; Benth. et Hook. f. Gen. Pl. i. 242.

Flowers minute. Sepals 4, 3-dentate or 3-fid, connate below. Petals 4, about equal to the sepals. Stamens 4, with or without intermediate teeth. Ovary 4-celled, each cell spuriously 2-locular. Styles 4, very short.—An erect annual herb of 1–3 in., repeatedly forked. Leaves opposite, exstipulate. Flowers in dichotomous cymose panicles.

A genus of a solitary species, widely spread in central and southern Europe, extending into temperate Asia, with outlying stations in the Atlantic islands and on the Camaroons mountain in W. tropical Africa.

1. **R. Millegrana,** *Sm. Engl. Bot.* 893. Leaves ovate or elliptical, rather acute, $\frac{1}{12}$–$\frac{1}{10}$ in. long. Flowers very numerous from the forks of the slender branches, on slender erect pedicels; the upper often in a crowded corymbose cyme.—*R. linioides*, Gmel.; DC. Prod. i. 428.

Upper Guinea. Camaroons mountain, 7000 ft., *Mann!*

Corresponds with the common European form as remarked by Dr. Hooker (Journ. Linn. Soc. vii. 184).

2. LINUM, Linn.; Benth. et Hook. f. Gen. Pl. i. 242.

Sepals 5, entire. Petals 5, contorted in æstivation, fugacious. Stamens 5, alternate with the petals, hypogynous, usually connate at the base, with 5 alternating setiform or tooth-like staminodia. Ovary 5-celled, with 2 ovules in each cell; each cell more or less deeply divided vertically by a spurious dissepiment so that the ovary appears 10-celled. Styles 5. Stigmas capitate, oblong or linear. Capsule separating septicidally into 5 2-seeded half-septate valves or into 10 1-seeded valves.—Herbs or shrubs. Leaves usually alternate, narrow, entire, glabrous, scabrid or pubescent. Flowers in corymbose cymes or cymose racemes or fascicles, usually blue or yellow, more rarely red or white.

A rather large and widely-spread genus of temperate and subtropical countries. Neither of the African species are endemic.

Flowers blue. Sepals eglandulose. Stigmas linear-clavate . . . *1. *L. usitatissimum.*
Flowers yellow. Sepals with marginal capitate glands. Stigmas capitate.
  Leaves and sepals scabrid, at least on the margin. Sepals much exceeding the capsule . . . . . 2. *L. strictum.*
  Glabrous. Sepals about equalling the capsule . . . . . 3. *L. gallicum*, var.

1.* **L. usitatissimum,** *Linn.; DC. Prod.* i. 426.

Cultivated. I have seen specimens only from Abyssinia, Angola, and the mouth of the Zambesi. In tropical countries it is chiefly grown for the sake of its seeds, which are eaten, and afford a valuable oil (Linseed oil); in temperate climates for its fibre (Flax).

2. **L. strictum,** *Linn.; DC. Prod.* i. 424. An erect herb, with ascending branches. Leaves linear, 1-nerved, scabrid on the margin and often on the under surface. Flowers yellow, small, in cymose corymbs, loosely forking or more usually rather closely fascicled. Sepals with an elongate green acumen from an ovate base, considerably exceeding the capsule, more or less scabrid-hispid; marginal capitate glands few. Stigmas capitate.—*L. abyssinicum*, Hochst. in Schimp. Pl. Abyss. n. 70. *L. corymbulosum*, Reichb.; Hochst. in Schimp. Pl. Abyss. n. 1901.

Nile Land. Abyssinia, *Schimper!*
Extends from the Canaries through the Mediterranean region to N.W. India.

3. **L. gallicum,** *L.*, var. **abyssinicum,** *Planch. in Lond. Journ. Bot.* vii. 479. A slender erect annual. Leaves linear or linear-lanceolate, acute, glabrous. Cymes loosely forking, paniculate. Flowers yellow. Sepals lanceolate, acuminate, with marginal glands, scarcely exceeding the capsule. Stigmas capitate.—*L. abyssinicum*, Hochst. in Schimp. Pl. Abyss. n. 1107.

Nile Land. Abyssinia, *Schimper!*
With a distribution similar to that of *L. strictum*, though perhaps not extending so far eastward.
L. mysorense, Benth. in Bot. Reg. sub t. 1326, agrees generally with the Abyssinian plant, in which the lateral nervures of the leaves appear to be more marked than in the usual form of *L. gallicum*, but the sepals appear different.

3. HUGONIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 243.

Sepals 5. Petals 5, contorted, fugacious, often with a minute claw. Stamens 10, monadelphous. Ovary 5-celled. Ovules geminate and collateral or solitary, pendulous or affixed a little below their apex. Styles 5, free. Stigmas dilated or cupulate-capitate. Fruit drupaceous, with a 5-celled (or fewer by abortion) putamen.—Climbing shrubs, often provided with hooked cirrhi. Leaves alternate, penninerved. Stipules entire or pinnatipartite. Flowers yellow, in axillary fascicles or terminal, spicate or paniculate.

A small genus, nearly confined to tropical Africa, India, and the intervening islands. The following species appear to be all endemic, and confined to the west of the continent.

Mature leaves densely hoary-tomentose beneath.
- Flowers spicate or paniculate. Ovary hirsute . . . . . 1. *H. spicata.*
- Flowers axillary. Ovary glabrous . . . . . 2. *H. Afzelii.*

Leaves 1 ft., narrowed below, hirsute on veins beneath. Ovules solitary . . . . . 3. *H. macrophylla.*

Leaves under 8 in., at length nearly or entirely glabrous.
- Young leaves with deciduous tomentum above and below. Sepals obtuse; inner obovate or rotundate . . . . . 4. *H. foliosa.*
- Leaves usually rounded at the base, obsoletely puberulous and dull above, sparsely pubescent beneath. Sepals from ovate-lanceolate to ovate; inner obtuse . . . . . 5. *H. angolensis.*
- Leaves narrowed to the base, glabrous, except midrib. Sepals ovate-lanceolate . . . . . 6. *H. Planchoni.*
- Leaves shining above. Inner sepals obcordate, apiculate; outer with revolute margins . . . . . 7. *H. platysepala.*

1. **H. spicata,** *Oliv.* An extensive climber. Extremities about as thick as a goose-quill, shortly tomentose-pubescent or puberulous at first. Leaves very coriaceous, oblong-elliptical or ovate-oblong, obtuse or acute, rounded and sometimes narrowly subcordate at the base, broadly crenate- or undulate-serrulate, dull or glaucescent and glabrous above, with reticulations perceptible to the touch when dry, softly and densely hoary-tomentose beneath, 5–8 in. long, 2–3½ in. broad; petioles ¼–½ in. Stipules pinnatipartite, deciduous. Flowers in erect, terminal and axillary, simple spikes 2–4 in. long, or branched below and somewhat panicled 2 or 3 together in the axils of pectinate bracts. Sepals ovate, tomentose externally. Petals oblong, obtuse, abruptly clawed. Ovary densely hirsute; styles glabrous above. Fruit globose, glabrous.

Upper Guinea. Fernando Po, *Mann!*

2. **H. Afzelii,** *R. Br.; Planch. in Lond. Journ. Bot.* vii. 525. Branches hoary-tomentose. Leaves oblanceolate-oblong or -elliptical, shortly acuminate, rather remotely serrulate or denticulate-serrate, at first with a deciduous tomentum above, soon glabrous and shining, white or pale-tomentose beneath; lateral veins with numerous, transverse, parallel veinlets, 3½–6 in. long, 1¼–1½ in broad; petiole about ¼ in. Stipules pinnatipartite or subpalmatifid; segments subulate. Flowers in axillary subsessile fascicles, more rarely pedunculate, shortly and closely racemose. Outer sepals ovate, densely silky-tomentose where exposed. Petals spreading or recurved, obovate or obovate-cuneate. Ovary glabrous. Ovules pendulous, in pairs. Fruit not seen.

Upper Guinea. Sierra Leone, *Afzelius!*

Var. *melanocalyx* (Welw.). Leaves usually more rounded at the base. Outer sepals clothed with a dark silky tomentum.

Lower Guinea. Pungo Andongo, Angola, *Dr. Welwitsch!*

The geminate ovules are so closely applied side by side in each cell of the ovary as to be easily mistaken for a solitary ovule.

3. **H. macrophylla,** *Oliv.* Leaves approximated or pseudo-verticillate towards the ends of the branches, elongate, firmly membranous, broadly oblanceolate or obovate-oblong, cuspidate, narrowed to the short hirsute petiole, glabrous or nearly so above; midrib and prominent principal veins hispid with spreading hairs beneath, 10–12 in. long, 3½–4 in. broad. Bracts imbricating, palmatipartite, with rigid subulate hispid segments, persistent. Flowers very shortly pedicellate, terminal in our specimen (fascicled or racemose?). Sepals ovate or ovate-rotundate; the inner larger. Petals elongate-cuneate, with a very short thick claw; 5–6 times longer than the sepals. Staminal tube thin. Ovary glabrous below, densely pilose above; styles elongate, pilose. Ovules solitary, pendulous.

Upper Guinea. Old Calabar, *Thomson!*

I have seen but a solitary specimen with few flowers.

4. **H. foliosa,** *Oliv.* Branches hoary-tomentose at first. Leaves rather coriaceous, elliptical or oblong-elliptical, rather abruptly acuminate, rounded or broadly cuneate at the base, irregularly and broadly serrate, covered with a thick deciduous tomentum when young, at length glabrous on both sides; lateral veins ¼–½ in. apart, connected by rather obscure transverse veinlets; about 6 in. long, 3 4 in. broad; petiole ¼ in. Stipules and bracts pinnatipartite; segments finely subulate. Flowers in few-flowered, sessile or subsessile, axillary fascicles. Outer sepals ovate, obtuse, densely tomentose externally; inner obovate or obovate-rotundate, obtusely and shortly pointed, the broadly covered coriaceous margins shining. Petals oblong-elliptical with a very short claw almost concealed by the narrowly emarginate base of the lamina. Staminal tube thick, one-third the length of filaments. Ovary glabrous; ovules geminate. Fruit not seen.

Upper Guinea. Bagroo river, *Mann!*

5. **H. angolensis,** *Welw. mss.* A graceful climber. Branches tawny-pubescent or puberulous, at length almost glabrous. Leaves lanceolate- or ovate-oblong, acute, usually more or less rounded, often broadly, at the base, serrulate or subentire, subglabrous or obsoletely puberulous and dull above (or the midrib more distinctly puberulous), thinly pubescent or in the younger leaves pubescent-tomentose beneath, 2½ 4 in. long, 1 1½ in. broad, or in the barren shoots considerably larger. Petiole ¼ in. or less. Stipules early deciduous, pectinate, with 2 or 3 acicular segments on each side; most conspicuous at the unfolded extremities. Flowers in fascicles of 2 or 3 from the axils of the upper leaves or somewhat shortly racemose at the extremities; common peduncles ½ in. or less. Outer sepals ovate-lanceolate, subacute, shortly tawny-tomentose, slightly exceeding the inner, which are more broadly ovate and obtuse. Petals very shortly and abruptly unguiculate. Fruit ovoid-globose, exceeding the persistent sepals.

Lower Guinea. Cazengo, Angola, *Dr. Welwitsch !*

Allied to *H. foliosa*, which differs in the thick, early-deciduous tomentum which clothes the young, more acuminate leaves, and in the form of the inner sepals.

6. **H. Planchoni,** *Hook. f. in Lond. Journ. Bot.* vii. 526. Branches rusty- or tawny-pubescent. Leaves firm, rather coriaceous, oval-oblong or oblanceolate-oval, acute or acuminate, narrowed to the base, rather remotely serrulate, glabrous, excepting the puberulous midrib; lateral veins ¼ to nearly ½ in. apart, connected by numerous transverse veinlets; 5–6 in. long, 1½ 2 in. broad; petiole ¼ in. or less. Stipules pinnatipartite with 2–3 subulate segments on each side, deciduous; bracts similar. Sepals ovate-lanceolate; margins involute above. Petals at least two to three times longer than the sepals, oblong-cuneate with a short, abrupt, narrow claw 1–1½ lines long. Ovary glabrous or with few hairs at the top; ovules geminate. Drupes globose.—Fl. Nigrit. t. 27.

Upper Guinea. Sierra Leone, *Afzelius ! T. Vogel !* etc.; Accra, *T. Vogel !* Bagroo river, *Mann !*

7. **H. platysepala,** *Welw. mss.* A shrub attaining 6–8 ft. Extremities puberulous or rusty with appressed or scarcely spreading pubescence. Leaves firmly membranous or subcoriaceous, broadly oblanceolate or obovate-oblong, acute or cuspidate, narrowed to the petiole, broadly and obscurely undulate-serrate or nearly entire, early glabrous and shining above; midrib and at first lateral veins with appressed hairs beneath; 4–6 in. long (or, in barren shoots, 6–9 in.), 1¼–2½ in. broad; petiole about ¼ in. Parallel curving lateral veins ⅛ ¼ in. apart. Stipules very early deciduous, palmatifid, silky-tomentose. Flowers 1–1¼ in. across, in short axillary and terminal, few-flowered racemes with a common peduncle of ½–1 in. or racemosely fascicled towards the ends of long axillary leafy or leafless often hook-bearing shoots; pedicels ¼–½ in., pubescent. Outer sepals smaller, ovate-rotundate, broadly pointed, with revolute margins; inner, equally or unequally broadly obcordate, apiculate, keeled below. Petals four to six times longer than the sepals, cuneate, thickened at the base with a very short claw, thinly appressed-pilose outside. Ovary glabrous, except the apex. Styles elongate, pilose below; ovules geminate. Fruit globose, orange-coloured, about ½ in. diam., sub-10-sulcate when dry.

Upper Guinea. Fernando Po and Prince's Island, *Mann !*
Lower Guinea. Golungo Alto, Angola, *Dr. Welwitsch !*

4. **PHYLLOCOSMUS,** Klotzsch; Benth. et Hook. f. Gen. Pl. i. 245.

Sepals 5, rather unequal. Petals 5, contorted, marcescent, unappendaged. Stamens 5 or 10; filaments connate at the base in a broad ring or very short tube. Ovary 3–5-celled; cells 2-ovulate. Style simple; stigma terminal, 3 5-denticulate or -lobulate. Capsule "dehiscing septicidally," 1- or 2-seeded.—Glabrous shrub or tree. Leaves alternate, coriaceous, pennivcined, entire or obscurely and remotely serrulate or toothed. Flowers rather small, in axillary, often fascicled racemes or terminal panicles, pedicellate or sessile. —(*Pentacocca*, Turcz. in Bull. Mosc. 1863. i. 600.)

The following are the only species of the genus, which is nearly allied to the S. American monotypic genus *Ochthocosmus*. I have not had the opportunity of examining good seeds.

Flowers pedicellate, in axillary racemes. Stamens 5. Leaves oblong-elliptical, 3–5 in. . . . . 1. *P. africanus.*
Flowers sessile, in terminal panicles. Stamens 10. Leaves obovate-oblong, 8–12 in. . . . . 2. *P. sessiliflorus.*

1. **P. africanus,** *Klotzsch in Schœnlein's Nachlass,* (*extr.*) 233. *t.* 2. Leaves thinly coriaceous, elliptic-oblong, narrowed to each end, acuminate, entire or with few scattered minute teeth on or towards the acumen, shining above, principal lateral veins rather distant, ½–1 in. apart in the longer leaves; 3–5 in. long, 1–1½ in. broad; petiole about ¼ in. Flowers ⅛–⅙ in., fascicled on the nodes of axillary solitary or fasciculate spreading or ascending, minutely puberulous racemes, shorter than or equalling the leaves; pedicels slender, equalling the flower, from minute scale-like bracts. Sepals broadly ovate-oblong, obtuse, minutely denticulate above, slightly unequal. Petals two to three times longer than the sepals. Stamens 5.—*Ochthocosmus africanus,* Hook. f. Fl. Nigrit. 240. t. 23. *Pentacocca Leonensis,* Turcz. in Bull. Mosc. xxxvi. (1863) 601.

Upper Guinea. Sierra Leone, *Don!* Cape Palmas, *Schœnlein.*

A fragment in fruit only in the Kew herbarium, from the Congo (*Smith*), with rather longer and glabrous pedicels, may belong to a distinct species.

2. **P. sessiliflorus,** *Oliv.* Leaves coriaceous, elongate-oblanceolate or obovate-oblong, subacute or rather obtuse, narrowed into the petiole, remotely crenate-serrate or subentire, glabrous; midrib and principal lateral veins rather prominent beneath, the latter about ¾–1 in. apart in the larger leaves; 8–12 in. long, 3–4½ in. broad; petiole stout, ¾–1¼ in. Flowers in long ebracteate spikes usually collected in rather large terminal panicles 6–10 in. long and broad; about ¼ in. long, inserted at right angles to the rachis. Sepals ovate obtuse, slightly imbricate below, 3 inner rather larger. Petals ovate-oblong, obtuse, rather rigid, three times longer than the sepals. Stamens 10; filaments united at the base in a broad disk or very short ring. Ovary 5-celled.

Upper Guinea. Gaboon river, *Mann!*

The dorsal suture shows some indication of inflection, so that it is possible the fruit-carpels may bear a spurious dissepiment, in which case the genus ought to merge in *Ochthocosmus.*

5. **ERYTHROXYLON,** Linn.; Benth. et Hook. f. Gen. Pl. i. 244.

Sepals usually 5, free or connate below. Petals as many, imbricating, deciduous, with an erect, transverse, usually 2-fid or variously thickened scale on the inner face. Stamens 10; filaments connate below. Ovary 3-rarely 4-celled, at the time of flowering all the cells but one suppressed; ovules usually solitary. Styles 3, rarely 4, free or connate more or less. Fruit a thin, 1-celled, 1-seeded drupe.—Shrubs or small trees, usually glabrous. Leaves alternate, membranous or coriaceous, entire. Stipules intrapetiolar, persistent or deciduous, sometimes leafless and crowded towards the

extremities, leaving conspicuous scars. Flowers small, pedicellate, in axillary fascicles.

A large S. American genus with but few outliers in the Old World, excepting in Madagascar and the neighbouring islands.

Styles connate halfway. Leaves firmly membranous, obovate-elliptical or elliptical; venation obscure beneath . . . . . 1. *E. Mannii.*
Styles free throughout. Leaves oval to oblanceolate-elliptical, more or less distinctly reticulated . . . . . 2. *E. emarginatum.*

1. **E. Mannii,** *Oliv.* Wholly glabrous. Leaves firmly membranous, obovate-elliptical or elliptical, very obtuse, entire or minutely emarginate, base cuneate, paler beneath, with obscure venation, 1¼–2 in. long, ⅔–1 in. broad. Petiole ¼ in. Stipules persistent. Flowers numerous, in axillary fascicles; pedicels slender, spreading, ¼–⅓ in. Calyx 5-fid; lobes ovate-deltoid, acute. Petals spreading or decurved; lamina adnate to the back of the orbicular claw, which is surmounted by an erect, 2-fid, membranous crest in front and a thickened process in the centre immediately behind. Styles connate half their length. Ovary 1-celled at flowering.

Upper Guinea. Bagroo river, *Mann!*

2. **E. emarginatum,** *Schum. et Thonn. Guin. Pl.* 224. A glabrous twiggy shrub or small tree. Leaves firmly membranous or subcoriaceous, oblanceolate-elliptical to oval, rounded above or slightly narrowed to a broad emarginate or entire apex, base cuneate or but slightly rounded, shining above, paler, usually with more or less prominent venation, beneath, 1–3½ in. long, ½–1¼ in. broad; petiole 1–3 lines. Pedicels fascicled, ¼ in. long or less. Calyx deeply 5-fid, with ovate acute segments. Petal-crest of 2 rounded membranous lobes. Styles 3, free. Drupe oblong-ovoid or ellipsoidal, ⅓–½ in. long. Seed exalbuminous.—*E. Caffrum,* Sond. in Linnæa, xxiii. 22.

Upper Guinea. Niger, *Barter!* W. tropical Africa, without special locality, *T. Vogel!*
Lower Guinea. Pungo Andongo, Angola, *Dr. Welwitsch!*
Mozamb. Distr. Rovuma Bay, *Dr. Kirk!* Zambesi, *Dr. Kirk!*

6. **ANEULOPHUS,** Benth.; Benth. et Hook. f. Gen. Pl. i. 244.

Calyx 5-partite. Petals 5, narrow-oval, spreading or recurved, undulate, thickened along the midrib and at the base, deciduous, unappendaged. Stamens 10, shortly connate at the base. Ovary 3–4-celled; cells 2-ovulate. Styles 3–4, connate below; stigmas linear-clavate, recurved. Drupe with a thick bony putamen, apparently 3-(or 4-)celled. Seeds unknown.—A glabrous shrub. Leaves opposite, oblong-elliptical, entire, thinly coriaceous, connected by a thickened (stipular?) ring. Flowers small, in axillary fascicles.

A monotypic genus peculiar to W. tropical Africa.

1. **A. africana,** *Benth. l. c.* Branches slender, terete, glabrous. Leaves opposite, oval-oblong or oblanceolate-oblong, shortly acuminate, cuneate or

scarcely rounded at the base, paler beneath, 3½–7 in. long, 1½–2½ in. broad; petiole ¼ in. Flowers several together from the axils or the thickened interpetiolar ridge, on slender pedicels of ¼–½ in. Calyx-lobes ovate-lanceolate. Petals several times longer than the sepals, patent or recurved.

Upper Guinea. Gaboon river, *Mann!*

Order XXIX. **HUMIRIACEÆ** (by Prof. Oliver).

Flowers regular, hermaphrodite. Sepals 5, imbricate. Petals 5, deciduous, slightly contort-imbricate or subvalvate. Stamens 10–20 or indefinite, hypogynous, usually more or less connate below; filaments filiform or narrow linear, compressed; anthers versatile with 2 cells at the base of a produced conical fleshy connective. Ovary free, sessile, usually 5-celled. Style simple; stigma terminal entire or denticulate; ovules solitary (or 2–3), pendulous. Fruit drupaceous with a woody or bony indehiscent putamen or pericarp, thick, woody, abounding in resin-cysts. Seeds albuminous (not examined in the African species).—Usually glabrous resiniferous trees. Leaves alternate, simple, coriaceous, exstipulate. Flowers in axillary or terminal corymbose or subpaniculate cymes.

A small Order confined to Brazil and Guiana, with the following exception.

1. **AUBRYA,** Baillon; Benth. et Hook. f. Gen. Pl. i. 988.

Petals very slightly imbricate or subvalvate. Stamens 10; filaments compressed, slightly connate below or free (*Baillon*). Ovary 5-celled. Style simple; ovules solitary. Fruit globose or ellipsoidal with a thick woody pericarp abounding in resin-cysts, indehiscent (?). Seeds not seen.—A large tree. Leaves coriaceous, glabrous. Flowers in axillary and apparently terminal pedunculate cymes.

Although there are two or three discrepancies between the account of *A. gabonensis* as published by M. Baillon and the result of my examination of a good series of specimens, including some from the Gaboon, yet I can hardly doubt that we have the same species in view. *Aubrya* is peculiar to W. tropical Africa.

1. **A. gabonensis,** *Baill. in Adansonia*, ii. 266. Leaves very coriaceous, oblong-elliptical, rather acute or with a short subacute acumen, rounded at the base and at length narrowed into the petiole, obscurely crenate-serrulate above, glabrous, venation but slightly prominent, either dark red-brown or pale green when dry, 3–6 in. long, 1½–2½ in. broad; petiole ¼–½ in. Flowers in stout axillary cymes forked from about the middle, shorter than the leaves, towards the ends of the branches or sometimes clustered in the uppermost leaves forming a small terminal panicle, minutely puberulous or glabrate. Pedicels stout, jointed at the base, about equalling the suborbicular ciliolate sepals. Petals rather thick, four to six times exceeding the sepals. Stamens at length often separating. Ovary glabrous. Fruit 1 in. or little more in diam.

Upper Guinea. Gaboon river, *A. le Comte, Mann!* Brass, *Barter!* Fernando Po, *Mann!*

M. Baillon describes the inflorescence as terminal and the stamens as wholly free.

ORDER XXX. MALPIGHIACEÆ (by Prof. Oliver).

Flowers hermaphrodite, regular or nearly so. Calyx 5-partite, rarely 4- or 3-partite, imbricate or valvate; each lobe or 4 or fewer 2-glandular, or gland solitary or 0. Petals 5, usually unguiculate; lamina entire or fimbriate. Stamens 10; filaments free or connate below. Ovary 3-celled. Styles 3 or 2, distinct, rarely connate; ovules solitary with a ventral raphe and superior micropyle. Fruit carpels (in the African genera) samaroid.—Climbing or erect shrubs. Leaves usually opposite (alternate in *Acridocarpus*) entire or nearly so, often with a pair of petiolar glands and appressed peltately-attached hairs; with or without stipules. Flowers yellow rose or white, corymbose umbellate or racemose, often panicled.

A considerable Order, most numerous both in genera and species in tropical America. Three of the following genera are peculiar to Africa.

Fruit-carpels with a single dorsal (median) wing only.
- Leaves opposite. Calyx usually with 8–10 glands . . . . 1. HETEROPTERYS.
- Leaves usually alternate. Calyx with few glands or one only, rarely 0. Styles 2 . . . . . 2. ACRIDOCARPUS.
- Leaves opposite or verticillate. Calyx eglandular. Styles 3 . 3. SPHEDAMNOCARPUS.

Fruit-carpels with lateral wings, distinct or connate above and below, with or without a smaller dorsal wing.
- Calyx equally 5-partite, shorter than the petals in bud. Petals fimbriate below . . . . . 4. TRIASPIS.
- Calyx-lobes valvate, 3–5, exceeding the petals in bud. Petals entire . . . . . 5. FLABELLARIA.

1. HETEROPTERYS, Kth.; Benth. et Hook. f. Gen. Pl. i. 256.

Calyx 5-parted, 4 or each of the lobes with a pair of sessile glands. Petals distinctly unguiculate. Stamens 10, all antheriferous, unequal; filaments slightly connate below; anthers unappendaged. Ovary 3-celled. Styles 3, subulate, sharply curved and compressed at the apex; stigma at the angle (like a foot with a stigmatic heel!). Samaras 1–3 with a more or less semicircular wing, usually thicker on the lower margin.—Erect or climbing shrubs. Leaves opposite, entire or nearly so. Flowers racemose or paniculate; pedicels 2-bracteolate.

A large American genus with but the following Old-World representative.

1. **H. africana,** *A. Juss. Monog. Malpigh.* 202. A glabrous climber. Leaves coriaceous, elliptic-oblong or -lanceolate, shortly acuminate cuspidate or subacute, rounded at the base or rarely subcordate, entire, glabrous, shining above, glaucescent beneath, with prominent midrib and lateral veins, 4½–8 in. long, 2–3½ in. broad; petiole ¼–⅓ in. Flowers "yellow," in terminal or axillary rusty-tomentose racemes, when terminal usually 3-furcate near the base or subpaniculate. Bracts and geminate bracteoles oval or oblong, the

latter about the middle of the pedicels. Samara semicircular, usually oblique; wing rigid, coriaceous, entire, rounded or obtuse at the outer extremity.—*Banisteria leona*, Cav. Diss. 424. t. 247. (*fructu excl.*) ex Juss. l. c. *H. Jussieui*, Hook. f. Fl. Nigrit. 246.

Upper Guinea. Senegambia! Sierra Leone, *Afzelius! T. Vogel!* and others; Grand Bassa, *T. Vogel!* Brass, *Barter!* Mouth of the Niger, Nun river, and Prince's Island, *Mann!*

Lower Guinea. Congo, *Smith!*

I cannot but regard the form described as *H. Jussieui* in the Niger flora with the wing of the samara, "produced equally above, below, and outwardly," as belonging to the original species of Jussieu. Vogel's fruits appear to be scarcely mature, and in other respects—foliage, flower, and inflorescence—there is no difference. In a specimen from Prince's Island, some of the leaves, upon a lateral shoot, are remarkably triplinerved.

Heteropterys macroptera, Reichb., is referred by A. Jussieu (l. c.) to *Securidaca*.

2. ACRIDOCARPUS, Guill. et Perr.; Benth. et Hook. f. Gen. Pl. i. 256.

Calyx 5-partite with 1 or more sessile or sunken glands, rarely eglandular. Petals unguiculate or narrowed to the base, entire or the inner slightly fimbriate. Stamens 10, all antheriferous; filaments short, free or very nearly so; anthers large, lanceolate-oblong, acute, glabrous, usually dehiscing at the apex by a short or pore-like slit. Ovary 3-celled or 1 cell abortive, pilose. Styles 2, long, filiform, circinate in bud. Samaras usually 1 or 2 with a straight or oblique vertical wing thickened on the upper margin.—Shrubs, erect or scandent. Leaves usually alternate, entire or sinuous with glands at the base beneath, exstipulate. Flowers in simple elongate corymbose or panicled racemes, yellow. Bracts and bracteoles minute at the base of the pedicels.

A small genus nearly confined to Africa and Madagascar. One species occurs south of the tropic of Capricorn.

Leaves 4–9 in., oblong-elliptical, cuspidate, glabrous. Flowers racemose or paniculate. Bracts 1 line or less, triangular. Wing 1½–1¾ in.	1. *A. Smeathmanni.*
Leaves 3–5 in., obovate or broadly elliptical, retuse, with obtuse or obsolete cusp. Bracts ovate, 2 lines. Wing 1½–1¾ in.	2. *A. plagiopterus.*
Leaves 2½–4 in., oblong-elliptical, subacute or cuspidate, glabrous. Flowers corymbose. Bracts subulate, rigid. Wings 1 in. or less	3. *A. corymbosus.*
Leaves 4–7 in., oval-oblong, with matted deciduous tomentum, at length glabrate at least above. Flowers racemose. Bracts triangular-lanceolate. Wings 1–1¼ (pale green)	4. *A. chloropterus.*
Leaves 3–4 in., oblong or oblanceolate, quite glabrous. Flowers racemose. Bracts minute, subulate. Wings 1–1½ in.	5. *A. zanzibaricus.*

1. **A. Smeathmanni,** *Guill. et Perr. Fl. Seneg.* i. 124. A shrub varying from 5–20 ft., often climbing, glabrous or with the extremities rusty-pubescent at first. Leaves alternate, membranous or rather coriaceous, elongate oblong-elliptical or obovate-oblong, cuspidate, more or less rounded or cuneate at the base with a pair of glands at the junction of the short thick petiole, entire or undulate, glabrous or early glabrescent, 4–9 in. long, 1½–3

in. broad; petiole $\frac{1}{8}$–$\frac{1}{4}$ in. Flowers in terminal simple branched or paniculate rusty-pubescent or -tomentose racemes often considerably overtopping the leaves, frequently also in shorter axillary racemes. Pedicels slender, $\frac{1}{2}$–$\frac{3}{4}$ in.; bracts triangular, acute, tooth-like, 1 line or usually less. Calyx variously thickened at the base, usually with 1 disciform gland alternating with 2 of the lobes. Wing of samara oblong or obliquely oblanceolate, more or less curved towards the obtuse extremity, $1\frac{1}{4}$–$1\frac{1}{2}$ in. long, $\frac{1}{2}$–$\frac{3}{4}$ in. broad, the base of the wing half-clasping the nut or slightly narrowed and not broader than the nut.—*Heteropterys? Smeathmanni*, DC. Prod. i. 592. (*ex* Juss.) *Anomalopteris spicata* and *A. longifolia*, Don, Gen. Syst. i. 647. *Acridocarpus guineensis*, A. Juss. Monog. Malpigh. 231. (? *A. Cavanillesii*, A. Juss. l. c.) *A. longifolius*, Hook. f. Fl. Nigrit. 244. (? *Malpighia alternifolia*, Schum. et Thonn. Guin. Pl. 222.)

Var. *α*. Wing of the fruit narrowed to the nut.

Upper Guinea. Sierra Leone, *Don!* Niger, *Barter! Baikie!* (the latter without precise locality.)

Var. *β*. Base of the wing half-clasping the nut.

Upper Guinea. Niger, Brass, Fernando Po, *T. Vogel! Barter! Mann!* In flower only, Gaboon, *Mann!*

The leaves vary considerably in texture in our specimens, but not more than is frequent in climbers which have their lower branches in the shade and their upper exposed. The differences in the outline of the samara may be more important than I have been led to consider them, although they are but slight absolutely. Unsupported, however, by other characters, I cannot regard them as of specific value.

2. **A. plagiopterus,** *Guill. et Perr. Fl. Seneg.* i. 123. *t.* 29. Very nearly allied to *A. Smeathmanni*, but with the leaves obovate-elliptical or broadly elliptical, rounded or retuse at the apex with a very short (1–2 lines) or obsolete or subacute cusp, obtuse or narrowed to the base with lateral petiolar glands, 3–5 in. long, 2–$2\frac{1}{2}$ in. broad. Bracts ovate or ovate-lanceolate, concave, $\frac{1}{6}$ in. Calyx-glands nearly obsolete on 1–3 of the lobes. Fruit-wings about $1\frac{1}{2}$ in., narrowed at the base, widely divergent according to Guillemin and Perrottet.—*Anomalopteris obovata*, Don, Gen. Syst. i. 642. (*ex* Fl. Nigrit. 244.)

Upper Guinea. Senegambia! Sierra Leone, *Don!*

3. **A. corymbosus,** *Hook. f. Fl. Nigrit.* 246. *t.* 24. Extremities slender, glabrous or very early glabrescent. Leaves alternate, firmly membranous, oblong-elliptical, subacute or cuspidate, rounded or slightly narrowed at the base, entire or undulate-denticulate, glabrous, $2\frac{1}{2}$–4 in. long, 1–2 in. broad, with or without the basal glands. Flowers in very short corymbose racemes, terminal or on short axillary shoots. Pedicels slender, spreading, rusty-pubescent, $\frac{1}{2}$–$\frac{3}{4}$ in. Bracts subulate, rather rigid. Calyx with 1–4 sunken glands. Wings glabrous, either rather broader above or broadly oblong, 1 in. or less in length, diverging at 70°–80° in our specimens, still red or purple when dry.

Upper Guinea. Cape Coast, *T. Vogel!* ? Kworra, *Barter!*
Lower Guinea. Congo, *Smith! Burton!*

This may prove to be the *Malpighia alternifolia* of Schumacher and Thonning, cited with doubt as a synonym of *A. Smeathmanni*.

4. **A. chloropterus,** *Oliv.* An erect or sometimes climbing shrub. Extremities rusty pilose-tomentose. Leaves alternate, somewhat coriaceous, elongate-oblong or oval-oblong, broadly and obtusely pointed or sometimes acute; base obtuse or broadly rounded, entire or obscurely wavy, covered at first with a thickly matted, rusty, loose tomentum, early deciduous above, the under surface usually retaining more or less of the deciduous layer; basal glands inconspicuous, 4–7 in. long, 1¼–2½ in. broad. Petiole ½ in. Flowers in an elongate, terminal, at length pyramidal, tomentose raceme of 5–8 in. Pedicels ½ in. or less; bracts minute, tooth-like, triangular or lanceolate. Calyx-glands about 3; lobes ovate, obtuse. Wings of fruit glabrescent (pale green, *ex icon.*), 1–1¼ in. long, ½–¾ in. broad; upper edge more or less curved, narrowed below, but at the base not narrower than the nut.

Mozamb. Distr. Valley of the Shire, Zambesi, *Drs. Kirk! and Meller!*

5. **A. zanzibaricus,** *A. Juss. Monog. Malpigh.* 231. A climbing shrub; the extremities rusty-tomentose, glabrescent. Leaves alternate, oblong or oblanceolate-elliptical, broadly pointed or subapiculate; base rounded or cuneate, narrowed into the petiole, quite glabrous, veiny, 3–4 in. long, 1¼–1½ in. broad. Petiole ⅓–½ in. Racemes terminal, simple, 2–3 in. long. Pedicels sometimes recurved at length. Bracts and bracteoles minute, many times shorter than the pedicels, subulate, very acute. Calyx-lobes ovate, obtuse; calycine glands usually 2. Fruit-wings 1–1½ in., narrowed below, dilated about the middle, with numerous curved, fine striæ.—*Banisteria,* Bojer (ex Loud. Hort. Brit. 182).

Mozamb. Distr. Zanzibar, *Dr. Kirk!*

A.? sp. nova. Specimens of a plant in flower (though with the essential organs too much eaten by insects for analysis) are in the Kew herbarium, from the "Red Sea," *Dr. Nimmo,* labelled *A. orientalis,* Juss., by Dr. Grisebach, but I cannot suppose it conspecific with Eloy's plant from Mascat, upon which Jussieu based his species. The leaves in the Red Sea plant are proportionally broader and shorter, broadly rounded at the apex and glabrous or glabrescent, the flowers not crowded, but in elongate racemes, much exceeding the leaves. It is probably new, unless a variety of *A. natalitius,* Juss., a Natal plant.

3. SPHEDAMNOCARPUS, Planch.; Benth. et Hook. f. Gen. Pl. i. 256.

Calyx 5-partite, eglandular or the glands not apparent when dry. Lobes slightly imbricate. Petals shortly clawed; lamina dentate or nearly entire. Stamens 10; filaments very shortly connate at the base. Ovary 3-celled; styles 3, filiform, spreading. Samaras with a vertical dorsal wing, slightly thickened on the upper margin, at least towards the base.—Shrubs or undershrubs, scandent or erect. Leaves opposite or verticillate. Flowers umbellate, collected in terminal panicles.

A small genus of 2 or 3 species, nearly allied to *Acridocarpus,* confined to S. tropical and extratropical Africa.

1. **S. angolensis,** *Planch. mss. in Herb. Kew.* Undershrub, not at all or very rarely scandent. Branches straight, about the thickness of a crow-

quill, closely rusty-tomentose. Leaves opposite or in verticils of 3 (or 4), oblong-lanceolate or oblong, subacute or rather obtuse, cuspidate or mucronate, more or less rounded at the base, appressed-pilose more or less above, silky-pilose or pilose-lanate beneath, subsessile or very shortly petiolate, with a pair of minute glands at the insertion of the petiole (*Dr. Welwitsch*), 1½–2 in. long, 5–8 lines broad. Flowers in 3–4-flowered pedunculate umbels from the axils of the upper leaves, often forming a large loose panicle; flower-bearing lateral branches 1–2½ in., usually bearing a pair of small leaves at or near the base of the umbels. Pedicels ½–1½ in., with a pair of scale-like bracts above or near the middle. Flowers ½–¾ in. in expansion. Sepals obovate-oblong, eglandular or glands not apparent when dry. Petals shortly unguiculate; lamina crisped-denticulate. Filaments subulate, very shortly united at the base. Ovary densely hairy. Fruit-carpels with an ascending obliquely oblong or obovate-oblong, obtuse, appressed-silky wing, about ¾ in. long and 4–5 lines broad.—*Acridocarpus? angolensis*, A. Juss. Monog. Malpigh. 236 (ex descr.).

Lower Guinea. Huilla, Angola, *Dr. Welwitsch!*

4. **TRIASPIS,** Burchell; Benth. et Hook. f. Gen. Pl. i. 259.

Calyx 5-partite, without glands. Petals unguiculate; base, at least, of the lamina fimbriate. Stamens 10, all antheriferous; filaments filiform, free or very nearly so; anthers linear-oblong, glabrous. Ovary 3-celled, pilose; styles 3, elongate; stigma lateral, immediately below the curved tip. Fruit-carpels with a shield-like entire or lobed dorsal wing, with or without a keel or crest in the centre.—Scandent or erect shrubs. Leaves opposite and subopposite, entire or nearly so, with or without stipules. Flowers umbellate or corymbose, in terminal and axillary panicles, "rose or white."

A small genus, peculiar to tropical and southern Africa.

Leaves silky or pilose beneath, exstipulate	1. *T. odorata.*
Leaves silky beneath, with reniform stipules	2. *T.? stipulata.*
Leaves glabrous or glabrescent, exstipulate.	
Petals fimbriate below. Ovary pilose. Fruit-wings 2-fid above, ½–1 in. long and broad	3. *T. mozambica.*
Petals, at least the inner, deeply fimbriate. Ovary pilose. Fruit-wings retuse or notched above, 1½–2½ in. long and broad	4. *T. macropteron.*
Petals entire or denticulate. Ovary glabrous. Fruit-wing broadly 2-partite above, much produced below, ½–¾ in. long and broad.	5. *T. lateriflora.*

1. **T. odorata,** *A. Juss. in Deless. Ic.* iii. 21. *t.* 36. Extremities terete, rusty-tomentose, glabrescent. Leaves opposite, ovate-oblong, subcordate, acute, crenulate-serrate or nearly entire, with thinly scattered hairs above, villous-tomentose beneath; petiole 1½ in. Flowers in corymbose racemes, collected in a terminal panicle, with divaricate branches; pedicels filiform, 1 in. or less, with a pair of minute bracteoles below or near the middle. Calyx 5-partite, with lanceolate, obtuse, silky-villous lobes. Petals unguiculate, 2 with fimbriate margins. Styles 3, filiform. Each samara with a dorsal wing, 2-fid or 2-lobed above and below.—*Hiræa odorata*, Willd.; DC. Prod. i. 585.

Upper Guinea, *Thonning.*

The above description is taken from Schumacher and Thonning's Besk. Guin. Pl., and Jussieu's figure.

2. **T.? stipulata,** *Oliv.* Branches terete, pilose, with closely appressed hairs, glabrescent. Leaves opposite, membranous, elliptical or ovate-elliptical, acute or acuminate, broadly rounded below, undulate-denticulate, glabrate and opaque above, more or less silky-pilose with appressed hairs beneath, 3–4 in. long, 1½–2½ in. broad; petioles ¼–½ in., with leafy semicircular or reniform stipular appendages, glabrescent above, silky beneath. Flowers very numerous, in large, terminal, leafy panicles. Pedicels umbellate or in umbellate corymbs, slender, ¾–1 in.; bracteoles very minute. Calyx-lobes ovate-oblong. Lamina of petals fimbriate below. Styles elongate, compressed, with a prominent nerve or 3-gonous. Fruit not seen.

Upper Guinea. Abbeokuta, *Irving!*

Referred to *Triaspis*, with a mark of doubt, by Dr. Hooker. The stipules are remarkable, but in the absence of fruit it may well be left in this genus, indeed, it may prove a form of *T. odorata.*

3. **T. mozambica,** *A. Juss. Monog. Malpigh.* 251. Extremities slender, terete, glabrous, ashen-grey, about the thickness of a crow-quill, with long internodes; at first with a deciduous rusty pubescence. Leaves opposite, elliptical, very shortly apiculate, rounded at the base, glabrous, rather firmly membranous or slightly fleshy, with obscure venation, about 2 in. long by 1–1¼ in. broad in the only specimen seen. Flowers in terminal panicles; pedicels slender, in few-flowered umbels, with a pair of minute, subopposite, ovate-lanceolate bracteoles below or near the middle, pilose as is also the base of the calyx. Lamina of the petals fimbriate below. Dorsal wing of the nuts deeply 2-fid above, ¾–1 in. long and broad, with radiating anastomosing nervures.

Mozamb. Distr. Mozambique, *Forbes!*

4. **T. macropteron,** *Welw. mss.* A scandent shrub. Extremities rusty-pubescent at first, glabrescent, sometimes early glabrous. Leaves subcoriaceous, ovate-elliptical, abruptly and acutely cuspidate or subacuminate, broadly rounded or slightly cordate at the base, entire, sparsely pubescent towards the base and about the nerves or nearly glabrous, 3–4 in. long, 1¾ 3 in. broad; petiole ½ in., more or less. Flowers lilac or violet, passing into white (*Welwitsch*), in axillary and terminal, pedunculate, corymbose racemes, exceeding or equalling the leaves. Pedicels rusty-pubescent, about 1½ in., with a pair of minute bracts below or near the middle. Sepals ovate-lanceolate obtuse. Petals clawed; lamina carinate; the inner ones deeply fimbriate. Filaments pubescent. Ovary rusty-pilose. Fruit-wings 1½ 2½ in. long and broad, retuse or notched above, entire or broadly retuse below.

Lower Guinea. Pungo Andongo, Cazengo, and Golungo Alto, Angola, *Dr. Welwitsch!*

5. **T. lateriflora,** *Oliv.* A scandent or subscandent shrub. Extremities and petioles rusty-tomentose. Leaves firmly membranous or thinly

coriaceous, elliptical or oblong-elliptical, obtuse or rather broadly cuspidate and somewhat acute, broadly rounded or occasionally subcordate at the base, entire, appressed rusty-pilose at first, early glabrescent above and beneath excepting usually the midrib, 2–4 in. long, 1½–2 in. broad or sometimes larger; petiole 1–4 lines. Flowers rose-coloured, in axillary shortly pedunculate umbels, much shorter than or occasionally equalling the leaves; peduncles often 2 or 3 together or from a very short or obsolete axillary branch; pedicels slender, ¼–¾ in., rusty-pilose, with scaly bracts at the base. Sepals oblong-lanceolate, obtuse. Petals clawed, reflexed; lamina entire or slightly denticulate. Filaments filiform. Ovary glabrous. Fruit-wings very thin, 6–10 lines broad and long, broadly 2-partite above, truncate or broadly retuse or 2-fid below; usually produced nearly twice as much below the carpel as above and nearly all the reticulating nervures directed downwards.

Lower Guinea. Angola, *Dr. Welwitsch!*

5. **FLABELLARIA,** Cav.; Benth. et Hook. f. Gen. Pl. i. 259.

Calyx 3–5-partite. Segments valvate in æstivation, often unequal in breadth, without glands. Petals oblong-lanceolate or oblanceolate, entire, glabrous. Stamens 10, all antheriferous; filaments filiform, free; anthers oblong. Ovary 3-celled, pilose; styles elongate. Fruit-carpels with a shield-like 2-lobed dorsal wing or the wings separate.—Scandent shrubs, with opposite, entire, exstipulate leaves. Flowers paniculate, white.

A monotypic genus, peculiar to W. tropical Africa.

1. **F. paniculata,** *Cav. Diss.* 436. *t.* 264. A climbing shrub. Extremities slender, silky-pilose at first. Leaves opposite, firmly membranous, broadly elliptical or ovate-elliptical, broadly pointed or subacute, broadly rounded or even subcordate at the base, without apparent basal glands, glabrous or glabrescent above, appressed silky-pilose beneath, 3–5 in. long, 2–3 in. broad; petiole ½ in. (¼–¾ in.). Flowers in terminal and axillary panicles, white. Pedicels in opposite pairs or corymbosely fascicled, ½ in. or less; bracteoles minute at or near the base. *Triaspis flabellaria,* A. Juss. Monog. Malpigh. 253. *Hiræa pinnata,* Willd. Sp. Pl. ii. 743. *Triopteris,* Poir. Dict. viii. 108.

Upper Guinea. Senegambia! Sierra Leone, *Smeathmann! Afzelius!* Fernando Po, *T. Vogel!* Niger, *Barter!* Old Calabar, *Thomson!*
Lower Guinea. Golungo Alto, Angola, *Dr. Welwitsch!*

Order XXXI. ZYGOPHYLLEÆ (by Prof. Oliver).

Flowers hermaphrodite, regular (in tropical species). Sepals usually 5, free or nearly so (0 in *Seetzenia*). Petals as many, free. Stamens as many or twice as many as the petals (thrice as many in *Nitraria*); filaments often with a minute scale at or near the base, free or those opposite to the petals very shortly adnate. Ovary usually 5-sulcate, 5-celled or 10-celled. Style simple or styles 5, radiating. Stigma terminal, simple or 5–10-lobed. Ovules

1–2 or more in each cell. Fruit crustaceous or coriaceous (in the following genera), often separating in as many dehiscent or indehiscent cocci as carpels, sometimes spinose or winged. Seeds with or without albumen. Embryo as long as the seed. Cotyledons oblong or linear; radicle straight.—Shrubs or herbs, woody below, with divaricate jointed branches. Leaves opposite, one of the pair usually smaller, 1–2-foliolate or pinnate, glabrous, pilose or hispid, often fleshy, with interpetiolar often spinescent stipules, rarely simple, alternate or fascicled (*Nitraria*). Flowers pedunculate, solitary or geminate, apparently axillary, usually yellow white or rose.

Leaves opposite.
  Flowers with petals.
    Leaves abruptly pinnate. Filaments naked . . . . . 1. TRIBULUS.
    Leaves 1–2-foliolate. Filaments with a scale at the base . . . 2. ZYGOPHYLLUM.
    Leaves 3–1-foliolate. Filaments naked . . . . . 3. FAGONIA.
  Flowers apetalous. Leaves 3-foliolate . . . . . 4. SEETZENIA.
Leaves alternate or fascicled, simple, spathulate or cuneate. (A spreading shrub.) . . . . . 5. NITRARIA.

1. TRIBULUS, Linn.; Benth. et Hook. f. Gen. Pl. i. 264.

Sepals 5, persistent or deciduous. Petals 5, spreading. Stamens 10; filaments filiform, those opposite to the petals sometimes adnate at the base. Ovary sessile, usually densely hirsute, 5–10-(–12-)celled. Style short; adnate lobes of the stigma as many as cells. Ovules 1–5, superimposed. Fruit of 5–12 indehiscent cocci (or fewer by abortion), woody or bony, spinose winged or tubercled. "Seeds exalbuminous."—Ascending or prostrate, branching, usually pilose or hispid herbs. Leaves opposite, one in each pair smaller, abruptly pinnate, stipulate. Flowers solitary, axillary, pedunculate, white or yellow.

The species want a thorough revision. I am not satisfied with the characters given below. It is doubtful if any of these species are confined to the tropics of this continent.

Ovary 5–(4-)celled. Stigma 5–(4-)angled or lobed.
  Carpels not winged, usually spinose . . . . . 1. *T. terrestris.*
  Carpels winged, with or without spinose margins.
    Fruit pyramidal-ovoid, spinosely winged . . . . . 2. *T. alatus.*
    Fruit roundish or roundish-ovoid, depressed at apex, 3–4 lines long and broad. Wings crenulate, about 1 line broad . . . 3. *T. pterocarpus.*
    Fruit larger than in No. 3. Wings toothed, strongly nerved, ¼–½ in. broad . . . . . 4. *T. Ehrenbergii.*
Ovary 10–12-celled. Stigma 10–12-angled or lobed . . . . . 5. *T. maximus.*

1. **T. terrestris,** *Linn.; DC. Prod.* i. 703. A spreading prostrate or decumbent annual, occasionally more or less frutescent below and persisting two or more years. Branches from a few inches to 2 or 3 ft. in length, pubescent, villous or hispid. Leaves in unequal pairs, the larger 1–2½ in., with 5–8 pairs of oblong or linear-oblong, more or less acute, sessile or subsessile, opposite leaflets, oblique at the base, villous beneath, often glabrescent above. Peduncles ¼–1 in., scarcely or not at all thickened in fruit. Flowers usually yellow. Stigmatic lobes longer than the diameter of the style (or shorter in β. *cistoides*). Calyx deciduous. Fruit-carpels tubercled and often setose on the back and above, each carpel usually with 2 lateral

divergent, straight, acute spines inserted above the middle and 2 shorter spines near the base directed downwards; the spines rarely reduced to mere tubercles.—*T. albus*, Poir.; DC. Prod. i. 703. *T. humifusus*, Schum. et Thonn. Guin. Pl. 215. *T. Kotschyanus*, Boiss. Diag. Ser. 2. i. 111. *T. mollis*, Ehrenb. in Schweinf. Fl. Æthiop. 29. *T. excrucians*, Wawr. et Peyr. Sert. Beng. 17.

Var. β. *cistoides* (*T. cistoides*, Linn.; DC. Prod. i. 703). Petals ¾–1¼ in. long. Stigmatic lobes not longer than the diameter of the style.

A widely-spread and very variable weed, common throughout tropical Africa as, indeed, through the tropics of the Old World, extending into South Europe and Australia. The variety *cistoides* is most frequent in tropical America. In Africa I have only seen it from Guinea (*Brunner*), Angola (*Dr. Welwitsch*), and Mozambique.

2. **T. alatus,** *Delile; DC. Prod.* i. 703. A procumbent or ascending, hispid-villous annual, very similar to *T. terrestris*, the general description of which will apply, differing principally in the fruit which is broadly pyramidal-ovoid, as broad as long, somewhat pointed; the spines more or less confluent into prominent vertical, hard or coriaceous wings on each side, the back of the carpels usually rugose, pilose. Calyx persistent or deciduous.—*T. longipetalus*, Viv. Dec. 10 (*fide* Boiss. Fl. Orient. i. 902).

Nile Land. Nubia (*Schweinf. et Asch. Enum.*).

From North Africa eastward to India.

3. **T. pterocarpus,** *Ehrenb. in Walp. Ann.* iv. 404, *and Schweinf. Fl. Æthiop.* i. 29. Habit and general aspect that of *T. terrestris*. Branches somewhat hispid-pilose, with unequal, spreading short hairs. Fruit reflexed or patent on peduncles of ½ in. or shorter, roundish or ovate-rotundate in circumscription, 3–4 lines long and broad. Carpels pilose on the back; margins with a continuous, crenulate, vertical wing, slightly exceeding the apex of the fruit, about 1 line broad; nerves of wing inconspicuous, parallel.—(An *T. macropterus*, Boiss. Diag. Ser. 1. i. 61? An etiam *T. megistopterus*, Kralik. in Ann. Sc. Nat. Ser. 3. xi. 32? cf. Schweinf. Fl. Æthiop. i. 249).

Nile Land. Dongola, *Ehrenberg!*

4. **T. Ehrenbergii,** *Asch. in Schweinf. Fl. Æthiop.* i. 249. Densely villous. Leaves 1½ in., 6-jugate. Peduncles erect, ⅓ in. or less. Fruit large, 4-angled, shortly and densely pubescent or pilose. Carpels broadly winged; wings rigid, ¼–½ in. long, ¼–⅓ in. broad, strongly reticulate below, irregularly and deeply toothed.—*T. cristatus*, Ehrenb. in Walp. Ann. iv. 404, and Schweinf. Fl. Æthiop. i. 29.

Nile Land. Dongola, *Ehrenberg!*

5. **T. maximus,** *Torr. et Gray, Fl. North Amer.* i. 213, var. *minor*. A spreading herb or suffrutescent, hispid-pilose or pubescent. Larger leaf of each pair with 3–4 pairs of elliptic-oblong, subacute or obtuse, mucronate leaflets, glabrate above. Peduncles shorter than or nearly equalling the leaves, at length slightly thickened upwards. Flowers small, white. Ovary pubescent, pyramidal, 10-celled. Calyx persistent.—*Kallstræmia minor*,

Hook. f. Fl. Nigrit. 269. *T. pubescens*, Don, Gen. Syst. i. 769 (ex Hook. f. l. c.).

Upper Guinea. Cape Coast, *T. Vogel!*
Chiefly confined to tropical America.

2. ZYGOPHYLLUM, Linn.; Benth. et Hook. f. Gen. Pl. i. 266.

Sepals 5 or 4, persistent or deciduous. Petals as many, unguiculate. Stamens 10–8; filaments filiform, with a minute scale at the base; anthers small. Ovary sessile, 5–4-gonous, 5–4-celled; style subulate or filiform; stigma minute. Ovules 2 or more. Fruit lobed, angled or winged, indehiscent or separating into as many cocci as carpels or loculicidally dehiscent. Seeds albuminous.—Frutescent herbs or shrubs, erect or prostrate, often spinose. Leaves opposite, 1–2-foliolate, often fleshy. Stipules 2. Peduncles solitary or geminate.

A considerable Old World genus, most numerous in extratropical Africa, Australia, and the deserts of western Asia.

Leaves simple.
- Leaves cylindric-clavate to obovate-oblong, 2–6(–12) lines long. Staminal scale 2-fid. Fruit obovoid, 1–2 lines long. (Annual.) . 1. *Z. simplex.*
- Leaves orbicular to obovate, 1–2½ in. broad. Staminal scale fimbriate. Fruit deeply winged, ½–¾ in. diam. . . . . 2. *Z. orbiculatum.*

Leaves 1-jugate.
- Papillose or hoary. Staminal scale entire. Fruit obcordate . . 3. *Z. album.*
- Glabrous. Staminal scale entire. Fruit clavate-prismatic . . . 4. *Z. coccineum.*
- Glabrous. Staminal scale 2-fid. Fruit turbinate . . . . . 5. *Z. decumbens.*

1. **Z. simplex,** *Linn.; DC. Prod.* i. 705. A much-branched, diffuse, decumbent or ascending, rarely erect annual, or frutescent below and perhaps biennial. Leaves of each pair 1-foliolate, unequal; the larger from 2–3 lines to ½ in. or more, fleshy, cylindric-clavate or flattened oblanceolate to obovate-oblong, obtuse. Peduncles very short, not exceeding the small yellow flowers, deflexed in fruit. Scales at the base of the filaments 2-partite. Fruit deeply 5-lobed, more or less broadly obovoid, about 1–1½ line long.

Nile Land. Nubia, *Ehrenberg*, and other provinces of Nile Land (*Schweinf. et Asch. Enum.*).
Lower Guinea. Benguella, *Dr. Curror!* Benguella and Mossamedes, (a fine series of varying forms), *Dr. Welwitsch!*
From Cape Verde Islands, eastward through North Africa to Scinde. Also at the Cape.

2. **Z. orbiculatum,** *Welw. mss.* Glabrous, glaucous, shrubby below, with oblique or ascending, succulent, terete branches, attaining 1–1½ ft. Leaves 1-foliolate; leaflets plane, thickly fleshy, flabellate-orbicular or obovate-spathulate, entire, shortly and cuneately contracted into the petiole, glabrous, often 2–2½ in. broad. Stipules fleshy, ovate, obtuse, ¼–⅓ in. Peduncles 2 3 together, 3–5 lines long, at length nearly 1 in. Petals white, twice as long as the obtuse sepals; apex rotundate, denticulate. Staminal scale fimbriate at the apex. Fruit broadly 5-winged, depressed, obovoid, subemarginate, 7–8 lines in diam.; wings strongly reticulate.

Lower Guinea. Mossamedes, *Dr. Welwitsch !*

Description abstracted from manuscript kindly lent by Dr. Welwitsch.

3. **Z. album,** *Linn.; DC. Prod.* i. 706. A minutely papillose-pubescent or hoary, decumbent, irregularly branching shrub; the branches often as thick as a goose-quill. Leaves diphyllous, fleshy; leaflets oblanceolate to obovoid or ellipsoidal obtuse, 2–4 lines long, on a thick fleshy petiole of 2–5 lines. Peduncles $\frac{1}{8}$–$\frac{1}{4}$ in. Sepals rotundate or obovate-elliptical, slightly concave or cucullate above. Petals with a roundish slightly toothed lamina, with a distinct claw. Staminal scale entire or denticulate. Fruit deeply 5-lobed, obcordate or turbinate-spherical; the lobes occasionally produced and divergent above, usually $\frac{1}{4}$–$\frac{1}{3}$ in. in length.—*Z. proliferum*, Forsk. Fl. Ægypt. 87 (*fide* Boiss. Fl. Orient. i. 915).

North Central. Everywhere in the desert (*Brown in Denh. et Clapp. App.* 230).
Nile Land. Nubia (*Schweinf. et Asch. Enum.*).
Also in North Africa and Arabia.

4. **Z. coccineum,** *Linn.; DC. Prod.* i. 706. Decumbent shrub, similar in habit to *Z. album*, wholly glabrous. Leaves diphyllous, fleshy; leaflets clavate or cylindric-clavate to subobovoid, usually 2–3 lines long on fleshy petioles of $\frac{1}{4}$–$\frac{1}{2}$ in. Peduncles $\frac{1}{3}$–$\frac{2}{3}$ in. Structure of flowers similar to that of *Z. album;* the staminal scales entire or denticulate; the petals somewhat apiculate. Fruit glabrous, clavate-prismatic, acutely 5-angled; apex retuse, 3–5 lines long.—*Z. desertorum*, Forsk. Fl. Ægypt. 87. *Z. propinquum*, Decaisne in Ann. Sc. Nat. Ser. 2. iii. 283 (*fide* Boiss. Fl. Orient. i. 915).

Nile Land. Soturba hills, Nubia, *Schweinfurth !*

Egypt and Arabia, eastward to Scinde.—The flowers are said to be either white or rose.

5. **Z. decumbens,** *Delile; DC. Prod.* i. 705. Much branching, decumbent, woody below, glabrous. Leaves unijugate, fleshy; leaflets plane, obovate to oblanceolate, very obtuse, $\frac{1}{4}$–$\frac{1}{2}$ in. long; petioles equalling or slightly exceeding the leaflets. Flowers numerous. Peduncles $\frac{1}{4}$–$\frac{1}{2}$ in., at length deflexed. Sepals obovate, cucullate, nearly equalling the oblong-spathulate white petals. Staminal scales deeply 2-fid with acute teeth. Capsule deeply 5-lobed, turbinate; apex entire, the carpels coherent to the extremity of the fruit, 2–3 lines long, 2–3 lines broad.—Delile, Fl. Ægypt. Atlas, t. 27. f. 3.

Nile Land. Soturba hills, Nubia, *Schweinfurth !* and in Egypt.

I have seen only fruiting specimens, which agree well with Delile's figure. The description of the flower is copied from Boissier's 'Flora Orientalis,' i. 914.

3. FAGONIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 267.

Sepals 5, deciduous, imbricate. Petals 5. Stamens 10; filaments filiform. Ovary sessile, pentagonous, 5-celled. Style subulate. Ovules geminate. Fruit pyramidal, deeply 5-lobed, separating in five 1-seeded cocci; endocarp horny, finally separating. "Seeds albuminous."—Much-branched

spinose herbs. Leaves opposite, 1–3-foliolate. Stipules usually spinescent. Peduncles solitary, 1-flowered, apparently axillary.

A small genus of few variable species.

1. **F. cretica,** *Linn.; DC. Prod.* i. 704. An erect or ascending, diffuse or densely-branched spinose annual, from a few inches to a foot or more in height, glandular-puberulous, scabrid or glabrescent. Leaves 1–3-foliolate; leaflets sessile or subsessile, oval lanceolate or oblanceolate, mucronate, often rather fleshy, puberulous or glabrate; petiole various, often very short. Stipular spines slender, straight, shorter or longer than the leaves. Flowers rose or lilac, "fragrant." Peduncles at length deflexed. Fruit apiculate, pubescent or glabrous.—*F. arabica,* Linn.; DC. Prod. i. 704. *F. glutinosa* and *F. latifolia,* Delile, Fl. Ægypt. 86. t. 28. *F. parviflora, F. Kahirana,* and *F. thebaica,* Boiss. Diag. Pl. Or. Ser. i. fasc. viii. 121–124. *F. armata,* R. Br. in Salt, Abyss. App. 64.—For more extended synonymy of this variable plant, see Anderson in Journ. Linn. Soc. v. Suppl. i. 11.

North Central. Aghadem, *Dr. Oudney! E. Vogel!*

Nile Land. Nubia, *Ehrenberg, Speke and Grant!* and others; Abyssinia, *Salt! Schimper!* Red Sea, *Nimmo!*

Occurs on both shores of the Mediterranean, in S. extratropical Africa, throughout the warmer dry parts of Asia, and again in Western N. and S. America.

The more important forms, recorded from Nubia or adjacent provinces, of this variable species, and which by many botanists are regarded as of specific rank, are (the characters briefly given in abstract from M. Boissier's 'Flora Orientalis,' i. 904–908):—

a. Glabrous, green. Extremities sulcate. Spines shorter than petiole. Leaflets 3, linear-lanceolate, acute.—(*F. cretica,* Linn.)

b. Erect, green, shortly glandular. Extremities striate. Spines exceeding the acute linear leaves.—(*F. arabica,* Linn.)

c. Green, glabrous; twigs striate. Upper spines equalling the fleshy 1–3-foliolate leaves. Leaflets oblong-cylindrical, obtuse, mucronate.—(*F. thebaica,* Boiss.)

d. Glabrous, except the minutely mealy, terete, striate extremities. Spines exceeding the 1-foliolate leaves. Leaflets linear-lanceolate.—(*F. parviflora,* Boiss.)

e. Viscid with sessile glands. Spines short. Leaflets minute, obovate to oblanceolate, obtuse or mucronate.—(*F. glutinosa,* Delile.)

f. Diffuse, glandular-pilose. Spines short. Leaflets 1–3; median rotundate-cuneate.—(*F. latifolia,* Delile.)

4. SEETZENIA, R. Br.; Benth. et Hook. f. Gen. Pl. i. 266.

Sepals 5, oblanceolate, acute, valvate, deciduous. Petals 0. Stamens 5; filaments filiform, naked. Ovary oblong-clavate, 5-sulcate. Styles 5, short, radiating or recurved; stigmas capitellate. Ovules solitary, pendulous. Fruit of five 1-seeded crustaceous cocci, separating septicidally.—Prostrate herb from a shrubby base or thick woody rootstock. Leaves opposite, 3-foliolate, with interpetiolar stipules. Flowers small, axillary, solitary.

Based upon a single wide-spread species, occurring at the Cape and from N. Africa eastward to N.W. India. I have not seen intertropical specimens but cannot doubt its occurring within our limits, although Willdenow's quotation of Sierra Leone as a station (under *Zygophyllum lanatum*) is disputed by R. Brown (Denham and Clapp. App. 26).

1. **S. africana,** *Br. in Denh. et Clapp. App.* 26. Papillose or smooth.

Leaflets fleshy, apiculate, the median obovate-cuneate, lateral oblique, ¼ in. long, more or less, rarely ½ in., exceeding or equalling the petiole. Peduncles ⅛–½ in., at length more or less recurved at the apex. Fruit ellipsoid or subglobose, the carpels separating longitudinally and exposing the smooth crustaceous endocarp more and more as it matures, ¼–⅓ in. long.—*S. orientalis*, Decne. in Ann. Sc. Nat. Sér. 2. iii. 281. t. 7. *Zygophyllum prostratum*, Thunb. fide Sond. Fl. Cap. i. 366.

Nile Land. Upper Egypt!

With regard to *Zygophyllum lanatum*, Willd., referred to above, it is described as woolly at the articulations and with long filiform styles, characters which do not well apply to the specimens which I have seen.

5. NITRARIA, Linn.; Benth. et Hook. f. l. c. 265.

Calyx small, usually 5-fid, persistent. Petals 5, rather fleshy, concave, induplicate-valvate. Stamens 15, rarely fewer; filaments naked, subulate. Ovary oblong-conical, "2–6-celled with a solitary ovule in each cell;" stigma 3-(2–6-)lobed; lobes adnate, shortly decurrent; ovules ascending from pendulous funicles, adnate near the middle. "Fruit narrow-conical, ½ in. long or less, with a thin pulpy epicarp and bony, longitudinally-sulcate, 1-seeded putamen, separating into 6 subulate teeth at the apex. Seed exalbuminous." —Glabrous or shortly silky-hoary shrubs, spinose or unarmed. Leaves alternate or fasciculate, spathulate or cuneate, minutely stipulate. Flowers in lateral scorpioid or corymbose cymes, sessile or pedicellate, white.

The two following are the only species of the genus which I have seen.

Leaves oblanceolate or spathulate, entire, usually obtuse. Flowers sessile or subsessile . . . . . 1. *N. Schoberi.*

Leaves obovate- or oblanceolate-cuneate, usually 3-toothed at the apex more or less. Flowers usually distinctly pedicellate . . . . . 2. *N. tridentata.*

1. **N. Schoberi,** *Linn.; DC. Prod.* iii. 456. A hoary or glabrous shrub with rigid, often long, decurved branches, with or without short, lateral, spinose ramuli. Leaves fleshy, fasciculate, oblanceolate- or obovate-cuneate to elongate-spathulate, obtuse, entire, glabrous or minutely silky-hoary, ½–1 in. long or more. Flowers in lateral subpaniculate scorpioid or corymbose cymes, exceeding the leaves, sessile or subsessile.—*N. senegalensis*, Lam.; DC. Prod. iii. 456; Lam. Ill. t. 403. f. 2.

Upper Guinea. Senegal!

Also in dry and saline regions of Asia and Australia.

2. **N. tridentata,** *Desf.; DC. Prod.* iii. 456. Differs from the usual forms of *N. Schoberi* in its more obovate-cuneate leaves usually 3-lobate or 3-dentate at the apex, ½–¾ in. long, 3–5 lines broad, and in the pedicellate flowers; pedicels frequently ¼ in. long or more.—Jaub. et Spach, Ill. t. 293, and *N. sericea*, t. 294.

I have no record of the occurrence of this species between the tropics. Caillaud (fide Delile, Voy. à Méroé, 99) found it at Rayân, between Fayoum and Syouah. M. Boissier reduces *N. senegalensis*, Lam. Encycl. iv. 493, Illust. 403. f. 2, to this species, but I think our Senegal specimen and Lamarck's figure agree better with *N. Schoberi*. The fruit of

this shrub, of which I have not seen very good specimens, Mr. Munby has suggested may have been the Lotos of the ancient lotophagi. It occurs in Northern Africa and eastward to Syria.

Order XXXII. GERANIACEÆ (by Prof. Oliver).

(*Impatiens*, by Dr. J. D. Hooker.)

Flowers hermaphrodite, regular or irregular. Sepals 5, free or rarely united below, usually imbricate, the posterior sometimes spurred. Petals 5 or rarely fewer by abortion. Stamens usually 10, all, 7, 6, or 5 only antheriferous, rarely 15 or 5 all antheriferous; filaments free or connate below; anthers often versatile, 2-celled, dehiscing longitudinally. Ovary usually 3–5-lobed, 3–5-celled. Styles free or united; stigmas various. Ovules 1, or 2 more or less superposed, rarely numerous. Fruit a 3–5-lobed capsule, usually with a central produced beak, separating septicidally into as many cocci as carpels or dehiscing loculicidally, rarely baccate. Seeds with little or no albumen.—Herbs or more rarely shrubs, glabrous pubescent or glandular. Leaves alternate or opposite, usually stipulate, simple or compound. Peduncles axillary or leaf-opposed. Flowers solitary, umbellate or various.

A considerable Order with representatives in every quarter of the globe. Two of the largest genera are very numerous at the Cape and characteristic of its Flora.

Tribe **Genanieæ.**—*Flowers regular or nearly so, usually with hypogynous glands. Sepals not spurred. Leaves simple.*

Stamens 15 . . . . . 1. Monsonia.
Stamens 10 . . . . . 2. Geranium.
Stamens 5 . . . . . 3. Erodium.

Tribe **Pelargonieæ.**—*Flowers irregular. Posterior sepal with an adnate spur.* 4. Pelargonium.

Tribe **Oxalideæ.**—*Flowers regular, hypogynous. Glands* 0. *Leaves compound.* 5. Oxalis.

Tribe **Balsamineæ.**—*Flowers irregular. Sepals coloured, the posterior spurred. Leaves simple* . . . . . 6. Impatiens.

1. MONSONIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 271.

(*Sarcocaulon*, DC.; Benth. et Hook. f. l. c.)

Flowers regular. Sepals 5, imbricate. Petals 5. Stamens 15, all antheriferous, in 5 connate phalanges of 3 each. Ovary 5-lobed, 5-celled; stigmatic lobes as many; ovules geminate, obliquely superposed. Cocci separating from the axis with revolute elastic tails pilose at the base within.—Herbs or frutescent; in sect. *Sarcocaulon* succulent. Leaves opposite or alternate, toothed or cut, petiolate, stipulate; petioles spinescent in sect. *Sarcocaulon*. Peduncles apparently axillary, 1–2-(or several-)flowered.

A small genus, principally confined to the Cape.

Fleshy. Spinose. Peduncles 1-flowered (*Sarcocaulon*) . . . . 1. *M. mossamedensis.*
Neither succulent nor spinescent.
Procumbent or prostrate. Leaves ovate-cordate. Peduncles 1-flowered . . . . . 2. *M. senegalensis.*
Erect or decumbent. Leaves lanceolate. Peduncles 1–3-flowered 3. *M. biflora.*

1. **M. mossamedensis,** *Welw. mss.* A low prostrate glabrate or minutely pulverulent shrub with thick, fleshy, divaricate branches, usually fiercely spinose from the persistent rigid petioles. Leaves broadly ovate-rotundate or subcordate, obscurely lobulate or sinuate, unequally denticulate, glabrous or pulverulent, the larger from ¾–1¼ in. long and broad; petioles ¾–1½ in., the lamina at length separating near the apex. Flowers lilac-purple, rather large, on 1-flowered peduncles bracteolate below the middle or at the base. Sepals elliptic-oblong, ⅓–½ in. long, with an apiculus of 1–2 lines. Petals ½–1 in. long. Filaments shortly polyadelphous. Fruit-carpels appressed-pilose below; beak 1½–2 in., glabrous.

Lower Guinea. Mossamedes, Angola, *Dr. Welwitsch!*

At once distinguished from the allied Cape species by the form of the leaves.

2. **M. senegalensis,** *Guill. et Perr. Fl. Seneg.* i. 131. A diffuse often frutescent herb with several or numerous procumbent, pubescent, minutely glandular branches spreading from the crown. Leaves cordate-ovate acute or rather obtuse and mucronate, repand-denticulate, glabrate above, pubescent or pilose at least on the principal nerves beneath, ¾–1½ in. long; petioles pubescent or pilose, usually longer than the lamina, of the radical leaves twice as long. Stipules subulate, sometimes rather rigid. Peduncles 1-flowered, with a pair of bracteoles near or below the middle, at which the peduncle is at length sharply deflexed. Petals but little exceeding the sepals. Carpels pilose; beak 3 in. long, pubescent or glabrate; tails pilose within.

Upper Guinea. Senegambia, *Perrottet and Leprieur, Bidjem!*
Nile Land. Abyssinia, *Schimper!* Upper Egypt and Kordofan, *Kotschy!*

Occurs in Namaqualand and again in Western India. Nearly allied to *M. ovata*, Cav., of the Cape, which appears to have much larger flowers, loosely pilose branches with spreading hairs, and irregularly crenulate leaves. I have not had good flowers of *M. senegalensis* for examination.

3. **M. biflora,** *DC. Prod.* i. 638. An annual herb of 6 in. to 1 ft., usually branching near the base, erect or with some of the branches procumbent, pubescent or puberulous, usually sparsely scattered with long patent hairs. Leaves oblong- or oval- to ovate-lanceolate, usually emarginate with a mucro, irregularly or remotely dentate-serrulate, glabrescent excepting on the nerves beneath, 1–2 in. long, ¼–¾ in. broad. Petiole shorter than or equalling the lamina. Stipules narrow-subulate, rather pungent. Peduncles 1–2–3-flowered with 2–4 subulate-filiform bracteoles near or below the middle. Petals not half as long again as the sepals in our specimens. Fruit similar to that of *M. senegalensis.*—*M. angustifolia*, E. Mey.; Rich. Fl. Abyss. i. 115.

Nile Land. Abyssinia, *Schimper!*
Lower Guinea. Huilla, Angola, *Dr. Welwitsch!*

Occurs at the Cape.

2. **GERANIUM,** Linn.; Benth. et Hook. f. Gen. Pl. i. 272.

Flowers regular. Sepals 5, imbricate. Petals 5. Stamens 10, usually all antheriferous, free or connate at the base. Ovary 5-lobed, 5-celled; stigmatic lobes as many; "ovules geminate, more or less superposed." Cocci

1-seeded, usually separating from the beak-like axis, with revolute elastic tails. Seeds with little or no albumen.—Herbs, occasionally shrubby or cæspitose. Leaves opposite or alternate, stipulate, palmately divided in the following species. Peduncles 1–2-flowered, axillary.

A rather large genus, widely dispersed in temperate countries. The tropical African species which are known to me appear peculiar to this continent and its islands.

Carpels smooth, pilose. Flowerstalks usually exceeding the leaves.
Pilose or pubescent. Teeth of the leaves broadly pointed, mucronulate or rather obtuse . . . . . 1. *G. simense.*
Retrorsely aculeolate. Teeth of leaves acute . . . . . 2. *G. aculeolatum.*
Carpels deeply pitted and tubercled. Flowerstalks very short . . . 3. *G. favosum.*

1. **G. simense,** *Hochst. in Rich. Fl. Abyss.* i. 116. A diffusely-branched procumbent or ascending herb. Stem pilose or pubescent with deflexed hairs at least above, often glabrescent below. Leaves 5-fid or sub-5-partite, more or less deeply incised with broadly pointed mucronulate or rather obtuse teeth, pilose-pubescent at least beneath. Petioles various, pilose or pubescent. Stipules ovate-elliptical, obtuse or rather acute, subscarious, glabrescent. Peduncles and pedicels exceeding the leaves. Sepals oblong-lanceolate, rather obtuse, apiculate, pilose, eglandular, shorter than the entire petals, which are obsoletely or slightly ciliate below. Carpels setose-pilose above, smooth.—*G. compar,* R. Br. in Salt, Abyss. App. 65. *G. latistipulatum,* Hochst.; Rich. l. c. *G. frigidum,* Hochst. in Pl. Schimp. Abyss. (ex Rich.)

Nile Land. Abyssinia, *Schimper! Salt!*

Var. *repens.* Stem very slender, rooting, patent-pilose. Peduncles elongate.—*G. emirnense,* Hils. et Boj. ms. in Herb. Kew; Dr. Hooker in Journ. Linn. Soc. vii. 185.

Upper Guinea. Fernando Po, 8–9000 ft., *Mann!*

Var. *glabrior.* Stem glabrous or nearly so, attaining, probably with support, 4–8 ft. Camaroons mountain, 7000 ft., *Mann!*

The variety which I have distinguished as *repens* agrees well with the Madagascar plant of Hilsenberg and Bojer, as shown by Dr. Hooker (Linn. Journ. 6), but except in respect of habit and indumentum, I see no character to distinguish either it or the glabrous form of the Camaroons from *G. simense.*

2. **G. aculeolatum,** *Oliv.* Perennial. Branches decumbent and rooting below or ascending, retrorsely aculeolate. Leaves 5-partite; segments deeply incised with acute teeth, sparsely setose-pilose beneath, glabrescent or with scattered pubescence above, 1½–2½ in. diam. or probably often larger. Peduncles with scattered recurved setæ, 2-flowered, exceeding the leaves; pedicels and sepals glandular-pilose. Sepals oblong-lanceolate with a rather long apiculus. Petals entire, ciliate at the base, about twice as long as the sepals. Carpels smooth, shortly pilose. Seeds very minutely punctate.

Nile Land. Abyssinia, *Schimper! Roth!*

Roth says the flowers are white. They are probably also purple.

3. **G. favosum,** *Hochst.; Rich. Fl. Abyss.* i. 117. Annual, ascending, more or less branched, from 1–3 or 4 ft. in height. Branches glandular-pilose above, glabrescent below. Leaves 5-partite or deeply 5-fid; segments

deeply somewhat pinnatifidly incised, usually with linear-oblong, toothed or entire, rather acute lobes, glabrescent; petioles of the stem-leaves pubescent or patent-pilose, usually exceeding the lamina. Peduncles from the lower axils very short or obsolete, upper 1–2 in., 2-flowered. Pedicels from 2 or 3 lines in the lower flowers to ½–1 in. Sepals glandular-pilose. Petals exceeding or even about half as long again as the sepals, entire, claw scarcely ciliate. Carpels deeply pitted in transverse lines with irregular intervening tubercles, glabrous, separating with or without a tail. Seeds minutely punctate.

Nile Land. Abyssinia, *Schimper! Dillon and Petit! Plowden!* (a form with narrow leaf-segments.)

Var. *sublævis*. Fruit-carpels with faint transverse lines from the dorsal suture, punctate-scabrid.

Upper Guinea. Camaroons mountain, 7000 ft., *Mann!*

3. **ERODIUM**, L'Hér.; Benth. et Hook. f. Gen. Pl. i. 272.

Same as *Geranium*, excepting that the antheriferous stamens are reduced to 5, alternating with as many staminodia, and the leaves (in two of the following species) pinnate. The petals are sometimes slightly unequal.

A widely spread genus, including a few common weeds of cultivation and waste ground. Of the latter are two of the following, which occur in Abyssinia.

Leaves pinnate.
- Leaflets pinnately toothed or serrate, ascending to 2–3 ft. . . . . 1. *E. moschatum*.
- Leaflets pinnatipartite or sub-2-pinnatifid, with acute segments.
  - Smaller throughout than *E. moschatum* . . . . . 2. *E. cicutarium*.

Leaves (radical) ovate-cordate, crenate, obscurely or distinctly 3–5-lobed.
- Low pubescent herb . . . . . 3. *E. malapoides*.

1. **E. moschatum,** *Willd.; DC. Prod.* i. 647. Branches laxly papillose-pilose, ascending, reaching 2–3 ft. Leaves pinnate; leaflets 9–13, ovate to ovate-oblong, serrate or pinnately toothed or acutely incised. "Filaments glabrous with a tooth on each side of the dilated base." Fruit and beak 1½–2 in. long.

Nile Land. Abyssinia (*Schweinf. et Asch. Enum.*).

Europe, North Africa, and elsewhere; introduced into tropical countries and at the Cape. Often faintly musk-scented.

2. **E. cicutarium,** *L'Hér.; DC. Prod.* i. 646. Stemless or usually with decumbent or ascending weak branches, considerably smaller in all its parts than *E. moschatum*; laxly, often glandular, pilose. Leaves pinnate; leaflets pinnatipartite or sub-2-pinnatifid with linear or oblong acute segments. "Filaments glabrous, not toothed." Fruit and beak 1–1½ in. long.

Nile Land. Abyssinia, *Schimper!*

Europe, North Africa, Asia, etc. *E. allotrichum*, Steud. (in Schimp. Pl. Abyss.), appears intermediate between the two above species, the differences between which it is difficult to define.

3. **E. malapoides,** *Willd.; DC. Prod.* i. 648. Stemless or with weak

decumbent or ascending branches more or less softly pubescent or pubescent-tomentose. Radical leaves ovate-cordate, obscurely or distinctly 3–5-lobed, unequally crenate, on rather long petioles; cauline ovate-oblong, lobed or subpinnatifid. Beak slender, 1½–2½ in. long.

Nile Land. Nubia (*Schweinf. et Asch. Enum.*).

4. PELARGONIUM, L'Hér.; Benth. et Hook. f. Gen. Pl. i. 273.

Flowers irregular. Sepals 5, the posterior sepal with a spur adnate to the pedicel. Petals 5 or fewer, the two upper dissimilar. Stamens 10, connate at the base, 7 or fewer antheriferous. Ovary and fruit as in *Geranium*.—Herbs or undershrubs, glandular, pubescent or glabrous. Leaves opposite or alternate, stipulate. Flowers umbellate, on leaf-opposed axillary or radical peduncles.

A large and characteristic Cape genus with but few outliers in tropical Africa, Western Asia, and Australasia. I have not satisfactorily identified any of the following with Cape species, excepting *P. flabellifolium*.

1–2 ft., erect or ascending. Leaves 5-fid, remotely toothed. Petals 5. Pedicels 1½–2 in., glabrous or thinly pubescent . .	1. *P. multibracteatum*.
Subcæspitose with a short erect stem. Leaves 5-partite with deeply 3-fid or subentire segments. Petals 5, entire. Pedicels strigillose, ¾ 1 in.	2. *P. quinquelobatum*.
Stem short, fleshy, rough with persistent bases of stipules. Leaves incise-lobate, toothed. Petals emarginate.	3. *P. cortusæfolium*.
Acaulescent or nearly so. Leaves flabelliform, palmatifid or palmatipartite. Segments entire or pinnatifid. Petals 5, entire .	4. *P. flabellifolium*.
Prostrate. Leaves rotundate-reniform, obscurely lobed, crenate. Petals 4	5. *P. glechomoides*.

1. **P. multibracteatum,** *Hochst. in Rich. Fl. Abyss.* i. 119. Stem somewhat shrubby below, attaining 1–2 ft. or more, thinly pilose or strigillose above, at length glabrous and shining, the older portions irregularly knotty. Leaves membranous, palmatifid or sub-7-fid with broadly oblong or ovate, obtuse or scarcely acute, remotely serrate or crenate-serrate segments, more or less appressed-pilose or hispid-pilose especially beneath, or subsericeous, 2–5 in. diam.; petioles various up to 6 in. Stipules ovate or ovate-elliptical, acute or acuminate, about ½ in. long. Peduncles elongate, 6 in. to 1 ft.; umbels 6–10-flowered; bracteoles lanceolate, acuminate. Pedicels 1½–1¾ in. Calyx-spur adnate nearly to the base of the pedicel. Petals 5, obovate-spathulate, entire, twice as long as the linear- or oblong-lanceolate apiculate sepals.—*P. abyssinicum*, R. Br. in Salt, Abyss. App. 65.

Nile Land. Abyssinia, thickets in rocky mountainous situations, *Salt! Schimper! Roth!* and others.

Apparently allied to *P. alchemilloides*, Willd.

2. **P. quinquelobatum,** *Hochst. in Rich. Fl. Abyss.* i. 118. Stems very short or attaining several inches from a subcæspitose rootstock, more or less clothed with a deflexed pubescence intermixed with long patent hairs. Leaves 5-partite; segments with one or two deep lateral rather obtuse lobes near the middle, lobate-dentate or subentire and oblong or linear, obtuse or

broadly pointed, with scattered appressed hairs or glabrate above, pilose- or hispid-pubescent especially on the nerves beneath, 2–4 in. diam., on petioles of 4–6 in. Stipules linear-lanceolate, at length reflexed. Peduncles elongate, 6 in. to 1 ft., 6–8-flowered; bracteoles subulate. Pedicels ¾–1 in., strigillose; spur adnate nearly to the base. Petals 5, oblong-spathulate, entire. Antheriferous stamens about 6. Ovary and style densely pilose.

Nile Land. Abyssinia, *Schimper!*

3. **P. cortusæfolium,** *L'Hér. Geran. t.* 25. "Stem short, thick, and fleshy, rough with persistent stipules. Leaves from the crown, on long petioles, cordate, inciso-lobate, undulate, unequally toothed, pubescent. Stipules subulate, their bases persistent. Peduncles elongate, branched, with many-flowered umbels. Calyx-tube four times as long as the ovate reflexed segments; petals obovate, emarginate."—Harvey in Fl. Capensis, i. 300.

South Central. N.W. of the Cape Colony, lat. 23° S., *Hove.*

Unknown to me excepting from the above reference.

4. **P. flabellifolium,** *Harv. Fl. Cap.* i. 277, var. *Benguellense,* Welw. mss. Acaulescent or stem very short, from a thick tuberous stock. Leaves coriaceous, on long erect peduncles of 2–6 in., broadly obovate- or rhomboid-cuneate in circumscription, variously palmatifid or palmatipartite; the segments entire incised or pinnatisect, retuse obtuse or acute; the lobes from 1 line to 1 in. in breadth, more or less sparsely scattered with spreading hairs or somewhat scabrid; nerves and reticulation very prominent. Stipules entire or 3-partite, linear-subulate. Scapes erect, 4–6 in., puberulous; umbels 6–10-flowered; involucral bracts linear-lanceolate. Pedicels 1–1½ in. Calyx-spur adnate very nearly or quite to the base. Sepals oval-oblong, subacute, about ¼ in. long. Petals red- or blackish-purple, obovate- or oblanceolate-oblong, one-third longer to nearly twice as long as the sepals. Beak slender, pubescent, 2 in. long.

Lower Guinea. Huilla, Angola, *Dr. Welwitsch!*

Also at Natal. The Angola plant differs from the type in its smaller flowers, which are fewer to the umbel, the much shorter sepals, which are not acuminate, and in the less-broadly ovate petals.

5. **P. glechomoides,** *Rich. Fl. Abyss.* i. 118. Stem prostrate, with scattered spreading hairs. Leaves rotundate-reniform, obscurely 5–7-lobed, broadly mucronulate-crenate, thinly pilose, especially on the nerves beneath or glabrescent, 1½–3½ in. diam., on petioles of 1–6 in. Stipules ovate-lanceolate, acuminate. Peduncles slender, with patent hairs, equalling or shorter than the leaves, several-flowered. Bracteoles lanceolate acute. Pedicels 1 in. or under; spur adnate half their length or rather more. Petals 4, 2 oblong-spathulate, 2 obovate-spathulate, much narrowed below, entire, about twice as long as the sepals. Antheriferous stamens 5, united at the base, with alternating subulate staminodia. Carpels smooth, pilose.

Nile Land. Abyssinia, *Petit, Roth!*

Resembles some forms of the Cape *P. odoratissimum.*

5. **OXALIS**, Linn.; Benth. et Hook. f. Gen. Pl. i. 276.

Flowers regular. Sepals 5, imbricate. Petals 5. Stamens 10, all antheriferous, free or slightly connate at the base. Ovary 5-lobed, 5-celled, with 5 distinct styles and capitate subcapitate or emarginate stigmas; ovules 1–∞. Capsule dehiscing loculicidally; valves persisting around the axis or spreading and free. Seeds albuminous, with a crustaceous testa.—Herbs, acaulescent or caulescent, rarely shrubby. Leaves radical or cauline, alternate, 3-foliolate or abruptly pinnate and multifoliolate, rarely with stipular appendages. Peduncles radical or axillary, with 1 or more (usually umbellate) flowers, yellow white or red.

A large and widely-spread genus in both hemispheres, with upwards of 100 species, peculiar or nearly so to the Cape, and a few widely disseminated tropical or subtropical weeds.

I have not seen the specimen of "*Averrhoa?*" from Senegambia, referred to in the 'Niger Flora.'

Leaves trifoliolate.
Unbranched.
Peduncles 1-flowered.
Bulbs smooth. Flowers about 1 in. Sepals without apical calli . . . . . 1. *O. obliquifolia.*
Bulbs angular, areolate. Flowers under 1 in. Sepals with apical calli . . . . . 2. *O. punctata*, var.
Peduncles 3–∞-flowered.
Stem 0 or short. Leaflets obcordate. Flowers purplish . . 3. *O. caprina*, var.
Stem 0 or elongate, slender. Leaflets 2-lobate, with ovate or oblong-ovate divaricate lobes. Flowers small, purplish . . 4. *O. semiloba.*
Leaflets obcordate-2-lobate; lobes rounded. Flowers ¾ in., yellow . . . . . 5. *O. cernua.*
Branching, with axillary peduncles . . . . . 6. *O. corniculata.*
Leaves abruptly pinnate, multifoliolate.
Sepals 5–7-nerved, exceeding the capsule . . . . . 7. *O. sensitiva.*
Sepals 3-nerved, not exceeding the capsule . . . . . 8. *O. abyssinica.*

1. **O. obliquifolia,** *Steud.; Rich. Fl. Abyss.* i. 123. Stem 0 or short and rhizomatous, from a dark brown ovoid or oblong bulb. Leaves tufted 3-foliolate, glabrous or nearly so, on petioles of ½–2 in.; leaflets rather succulent, cuneate, obtusely rounded above, entire or the median leaflet retuse, ⅛–¾ in. broad. Peduncles 1-flowered, glabrous, with a pair of narrow-subulate or filiform bracteoles, sometimes with a second flower from one of the latter, exceeding the leaves. Sepals oblong-lanceolate, apparently without glandular calli. Petals 1 in. long or less, purplish above (*Rich.*).

Nile Land. Mountainous places, Abyssinia, *Schimper! Parkyns!*

Nearly allied to *O. convexula*, Jacq., a Cape species, and perhaps a variety of it rather than a distinct species.

2. **O. punctata,** *Linn.; DC. Prod.* i. 699, *var.* **glabrata,** *Sond. in Fl. Cap.* i. 335. Acaulescent or rhizomatous, from a blackish ovoid areolate-reticulate bulb. Leaves tufted, 3-foliolate, glabrous, on petioles of 1–2½ in.; leaflets broadly obovate-cuneate, broader than long, entire or the median retuse, depressed-punctate on the lower surface when dry, 3–4 lines broad.

Peduncles slender, 1-flowered, exceeding the leaves, glabrous, with a pair of bracteoles above the middle. Sepals 2 lines long, obtuse, with minute apical glandular calli. Petals 3–4 times longer than the sepals, glandular at the apex, rose-violet.—*O. glabella*, E. Mey. (Sond. l. c.).

Lower Guinea. Angola, prov. Huilla, *Dr. Welwitsch!*

Somewhat larger than our Cape specimens; the sepals nearly twice as long.

3. **O. caprina,** *Linn.; DC. Prod.* i. 696, *var.* **abyssinica.** Acaulescent or stem very short, from an oblong-ovoid bulb, covered with pale shining brown scales, acute above. Leaves on petioles of 2 or 3 to 6 in., sparsely pilose below, with short membranous sheaths; leaflets obcordate, with broad rounded lobes, glabrous or nearly so. Flowers about ½ in. long, in 3–8-flowered umbels on elongate weak glabrous or pilose, succulent peduncles exceeding the leaves. Pedicels and sepals thinly pilose-pubescent. Sepals lanceolate, rather obtuse, with linear pale orange calli. Petals 2–3 times longer than the sepals, purplish.—*O. anthelmintica*, Rich. Fl. Abyss. i. 124. t. 23. *O. abyssinica*, Turcz. in Bull. Mosc. xxxi. (1858) 432.

Nile Land. Abyssinia, *Schimper!*

A Cape species.

4. **O. semiloba,** *Sond. Fl. Cap.* i. 350. Stem varying according to habitat, short or obsolete, or in long grass erect, straight, 1 ft. or less. Leaves 3-foliolate, in a terminal tuft, on long thinly pilose or nearly glabrous petioles of 1–3 in.; leaflets 2-lobate-cuneate, with ovate or ovate-oblong, obtuse, divaricate lobes, sparsely pubescent or shortly pilose, at least beneath, or glabrous, ¾–1½ in. broad. Flowers ½ in. or less, in 5–15-flowered umbels; peduncles slender, exceeding the leaves. Sepals oblong-lanceolate, rather obtuse, with apical orange calli. Petals purplish, 2–4 times as long as the sepals. Styles pubescent, recurved (in *Dr. Kirk's figure*).

Lower Guinea. Huilla, Angola, *Dr. Welwitsch!*

Mozamb. Distr. Zambesi land, Manganya country, and Moramballa, up to 3000 ft. (*var. parviflora*), *Dr. Kirk!*

O. semiloba is described as stemless, but we have it from within the limits of the Cape flora with a distinct stem. It no doubt varies with habitat.

Dr. Welwitsch's specimens exhibit the attached bulbs, which are narrowly ovoid, clothed with thin, shining, easily separable, membranous, brown scales.

*5. **O. cernua,** *Thunb.; DC. Prod.* i. 696.

I have only seen a fragmentary specimen, flowered at Kew, from seeds said to have been sent home by Barter.—With or without a stem. Leaves glabrous or nearly so, on petioles of several inches; leaflets 2-lobate-cuneate, with rounded lobes. Flowers yellow, about ¾ in., in several-flowered umbels; peduncles long, succulent, exceeding the leaves. Sepals oblong-lanceolate, rather obtuse, with apical glands, nearly half as long as the petals.

As mistakes from the intermingling of seeds, etc., are unavoidable in cultivation, this species cannot be finally accepted as tropical African.

6. **O. corniculata,** *Linn.; DC. Prod.* i. 692. A diffuse, procumbent or ascending, branched, pubescent or shortly pilose herb, with a fibrous root. Leaves very various in size, 3-foliolate, on slender petioles of 1–3 in. or

more; leaflets obcordate-cuneate, with rounded lobes. Stipules minute, adnate to the base of the petiole or obsolete. Peduncles axillary, 1–4-flowered, shorter or longer than the leaves. Flowers yellow. Capsule subcylindrical, pubescent, pointed, 5–8 times longer than the sepals.—*O. procumbens*, Steud.; Rich. Fl. Abyss. i. 123 (a small-leaved form). *O. radicosa*, Rich. l. c.

Var. β. *stricta* (*O. stricta*, Linn.; DC. Prod. i. 692). Erect or ascending. Stipules obsolete. Pedicels usually ascending in fruit.

Upper Guinea. Camaroons and Fernando Po, 7000–9000 ft., *Mann!* Prince's Island, *Dr. Welwitsch!*
Nile Land. Usui, *Speke and Grant!* Abyssinia, *Schimper! Roth!*
Lower Guinea. Angola, *Dr. Welwitsch!*
Mozamb. Distr. Moramballa, *Dr. Kirk!*
A weed of cultivation and waste ground, in nearly all warm countries.

7. **O.** (§ **Biophytum**) **sensitiva,** *Linn.; DC. Prod.* i. 690. Either acaulescent or with an erect, usually unbranched, herbaceous or wiry stem, a few inches to a foot in height. Leaves spreading in a terminal rosette or crown, abruptly pinnate; rachis usually pubescent or hispidulous; leaflets in 6–14 sessile pairs, the upper pairs often larger, obliquely quadrate-rotundate rhomboid-oblong or the lower subdeltoid, base more or less truncate, more or less coriaceous, glabrous, the oblique or diagonal midrib and lateral veins often prominent beneath. Flowers in sessile, crowded or pedunculate, bracteate heads. Peduncles rarely much exceeding the leaves. Flowers on very short pedicels, exceeding or equalling the subulate bracteoles, yellow or red. Sepals linear-lanceolate, attenuated to a fine point, 5–7-nerved, exceeding the capsule. Styles varying in relative length, probably with other dimorphic conditions, shorter or longer (to twice as long) than the ovary, sparsely hairy, undivided.—*Biophytum Petersianum*, Klotzsch in Peters' Mossamb. Bot. 81. t. 15.

Upper Guinea. Senegambia! Niger and Quorra, *T. Vogel! Irving! Barter!* Camaroons, *Mann!*
Nile Land. Unyoro, *Speke and Grant!* White Nile, *Murie!*
Lower Guinea. Angola, prov. Pungo Andongo, *Dr. Welwitsch!*
Mozamb. Distr. Quillimane, *Dr. Kirk!* Querimba and Zanzibar (*Klotzsch, l. c.*).
Also in tropical Asia.
Klotzsch describes his plant as with 2-fid styles; but from what I have seen of these in our specimens from the same country, I believe that this splitting takes place with maturation, and that the fission is continuous with the line of loculicidal dehiscence.

8. **O.** (§ **Biophytum**) **abyssinica,** *Steud.; Rich. Fl. Abyss.* i. 122. Very similar to the above in habit, perhaps usually more slender and the leaves more membranous. Peduncles usually equalling, or falling but little short of, the leaves. Sepals linear-lanceolate, strongly 3-nerved, falling short of or nearly equalling the ripe capsule.

Nile Land. Abyssinia, *Schimper!*
Lower Guinea. Angola, prov. Pungo Andongo, *Dr. Welwitsch!*

O. (Biophytum) n. sp.? In habit similar to the above. Leaflets in numerous (about 16)

pairs, obliquely rectangular-oblong, somewhat pointed. Flower-heads on very short peduncles; bracts very numerous, aristate, more or less spreading or squarrose, equalling or exceeding the flowers, which are described as "red and white, becoming purple on withering." Styles elongate. Ovules about 3 in each cell. Seeds rugose-tuberculate.

Upper Guinea. Old Calabar, *Thomson!*

Much resembling *O. dendroides*, but the flower-heads more like those of *O. lindsæafolia*.

6. IMPATIENS, Linn.; Benth. et Hook. f. Gen. Pl. i. 277.
(By Dr. J. D. Hooker.)

Flowers irregular. Sepals 3 (rarely 5); 2 lateral small, green; lower very large, coloured, conical, funnel-, boat- or trumpet-shaped, spurred. Petals 3; back one usually erect and orbicular, often keeled or winged at the back; lateral very variable in shape and size, spreading laterally and hanging down, more or less 2-lobed or auricled at the base. Stamens 5; filaments short, flattened; anthers connate or cohering over the stigma. Ovary enclosed in the tube formed by the filaments, 5-celled; stigma sessile, 5-toothed; ovules numerous. Capsule elastically splitting into 5 twisted valves.—Annual, often tender or succulent herbs, rarely shrubby below, or perennial. Leaves opposite whorled or alternate, toothed serrate or crenate; the serratures or teeth with glandular cilia on their tips or between them. Petioles often glandular as are the tips of the bracts and sepals. Flowers often beautiful, solitary, fascicled, racemose or subumbellate.

A very large Indian genus, also abundant in tropical Africa, but of which the species are most difficult to preserve, and hence to describe from dried specimens. In the following diagnoses, the 2 small, green, lateral sepals alone are called *sepals*; the spurred sepal *lip*; the posterior petal *standard*; and the two lateral *wings*.

A. *Flowers solitary or fascicled in the axils of the leaves (pedicels rarely collected on a short common peduncle).*

a. Lip large, trumpet- or boat-shaped, with a short stout incurved spur.

* *Wings and standard not broader than the orifice of the trumpet-shaped lip.*

Flowers densely fascicled. Sepals minute . . . . . 1. *I. bicolor.*
Flowers subsolitary. Sepals broad . . . . . 2. *I. buccinalis.*

** *Wings very large, broader than the large boat-shaped lip* . . . 3. *I. Mackeyana.*

β. Lip with a long, slender, straight or incurved spur.

* *Spur nearly straight, not much longer than the body of the lip.*

Flowers 1½–2½ in. diam., hairy . . . . . 4. *I. Burtoni.*
Flowers ½–¾ in. diam., glabrous . . . . . 5. *I. Mannii.*

** *Spur much longer than the body of the lip.*

Stem and leaves below glabrous or nearly so.
Leaves oblong, crenate, with cilia in the crenatures . . . . . 6. *I. capensis.*
Leaves lanceolate, acutely serrate . . . . . 7. *I. Irvingii.*
Stem and leaves below pubescent . . . . . 8. *I. Kirkii.*

B. *Flowers racemed or umbelled at the end of a long common peduncle.*

a. Lip elongate-conic or trumpet-shaped, gradually narrowed into the short stout spur.

* *Leaves opposite or whorled* . . . . . 9. *I. Sakeriana.*

** *Leaves alternate.*

Stem 1–2 in. Leaves cordate. Peduncle solitary, very long . . . 10. *I. palpebrata.*
Stem 2–3 ft. Leaves not cordate. Peduncles numerous.
Wings narrow-linear . . . . . 11. *I. kians.*
Wings very large, broad. Leaves crenate, with cilia in the crenatures . . . . . 12. *I. macroptera.*
Wings broad. Leaves serrate . . . . . 13. *I. Rothii.*

β. *Lip with a long slender spur. Flowers umbelled.*

* *Lip funnel-shaped, gradually narrowed into a pendulous spur, 2–4 in. long* . . . . . 14. *I. tinctoria.*

** *Lip very short, suddenly narrowed into a slender spur.*

Leaves serrate. Bracts large. Spur up-curved, twice as long as the wings . . . . . 15. *I. abyssinica.*
Leaves serrate. Bracts small. Spur 4–5 times as long as the wings. 16. *I. Walleriana.*
Leaves crenate. Bracts large. Spur as long as the wings . . . . 17. *I. filicornu.*

1. **I. bicolor,** *Hook. f. in Journ. Linn. Soc.* vi. 7. Stem 1–3 ft., woody below. Leaves alternate, glabrous, 3–5 in., oblong-ovate, crenate, narrowed into slender glandular petioles. Flowers crowded in the axils of the upper leaves; pedicels 1–2 in. Standard short, greenish-white. Wings of the same colour, deeply 2-lobed, as short as the mouth of the lip which they close. Lip ¾ in. long, forming a long purple sac, with a turned-up short cylindric spur.—Bot. Mag. t. 5366.

Upper Guinea. Fernando Po (Dec.), Camaroons mountain (Feb.), and Sierra del Crystal (July), alt. 3000–4000 ft., *Mann!*

2. **I. buccinalis,** *Hook. f. in Journ. Linn. Soc.* vii. 187. Tall, 12–15 ft., branched, glabrous, woody below. Branches often zigzag. Leaves 3–5 in., petioles slender, ½–1 in., oblong-lanceolate, crenate with cilia in the crenatures. Flowers solitary or nearly so; pedicels 1–1½ in. Sepals large, orbicular-ovate. Standard with a broad dorsal wing. Wings suborbicular, not longer than the mouth of the lip, Lip 1–1½ in. long, trumpet-shaped, with a short, thick, sometimes double, incurved or involute spur.

Upper Guinea. Island of St. Thomas, alt. 4000 ft., *Mann!*—Colour of flower unknown.

3. **I. Mackeyana,** *Hook. f. in Journ. Linn. Soc.* vii. 188. Short, 1½ foot, stout, glabrous, herbaceous. Leaves crowded at the top of the stem, spreading, 4–7 in., narrow-lanceolate, tapering into petioles of 1–4 in., sharply serrate; the serratures tipped with cilia. Flowers solitary or the slender pedicels crowded on a short peduncle, very large, purple. Sepals oblong-ovate. Standard orbicular, keeled. Wings 1–1½ in. long, broadly obovate, with large rounded lateral lobes. Lip boat-shaped, large, rather shallow, with a short up-curved spur.

Upper Guinea. Sierra del Crystal, on rocks in rivers (Feb.), *Mann!*

4. **I. Burtoni,** *Hook. f. in Journ. Linn. Soc.* vii. 187. Herbaceous, 2–3 ft., sparsely pilose. Leaves alternate, 3–5 in., on slender petioles,

ovate- or oblong-lanceolate, crenulate. Flowers pilose, solitary, on slender pedicels 1½–3 in. long. Sepals lanceolate. Standard orbicular. Wings semiorbicular, ¾ in. long, with suborbicular lateral lobes. Lip conical, with a slender spur about its own length.

Upper Guinea. Camaroons mountain, alt. 2000–4000 ft. (Dec., July), *Mann!*

5. **I. Mannii,** *Hook. f. in Journ. Linn. Soc.* vi. 7. Herbaceous, 1–2 ft., slender, glabrous. Stem often rooting at the lower nodes. Leaves distant, alternate, 1½–3 in., ovate or oblong-ovate, crenate, narrowed into slender petioles of 1–2 in. Flowers rather small, light red, solitary or in pairs; pedicel very slender, ½–1 in. Sepals minute. Standard small, orbicular. Wings broadly and obliquely semiorbicular, each ⅓–¾ in. broad, with slender claws and short recurved spur-like auricles at the base of the blade. Lip funnel-shaped, with a slender spur. Capsule pendulous, linear.

Upper Guinea. Fernando Po, 2000–4000 ft. (April and Dec.); Camaroons mountain, 2000–3000 ft. (Dec.), *Mann!*

6. **I. capensis,** *Thunb.; Harv. and Sond. Fl. Cap.* i. 312. Herbaceous, glabrous, 1–2 ft. high. Leaves alternate, 1–3 in., ovate or oblong-ovate or lanceolate, crenate, with cilia in the crenatures, their base and petioles sparingly ciliated. Flowers solitary, on slender pedicels longer than the petioles. Sepals oblong-lanceolate. Standard rather small, keeled. Wings falcate, obtuse, ¼ in. long, 2-lobed at the outer side. Lip funnel-shaped, tapering into a long slender spur.

Lower Guinea. Angola, prov. Pungo Andongo, *Dr. Welwitsch!*
Mozamb. Distr. Mount Chiradzura, Manganya range (Sept.), *Dr. Meller!*

This appears to be the same as the S. African plant found in Natal, Uitenhage, and the Orange Free State, but it is impossible to compare the dried flowers accurately.

7. **I. Irvingii,** *Hook. f.* Herbaceous, succulent, 2–4 ft., glabrous or slightly pubescent in the upper parts. Leaves alternate, rarely opposite, 3–5 in., on very short petioles, lanceolate, serrulate. Flowers solitary or in pairs, red. Pedicels very slender, 3–6 in. Sepals oblong-lanceolate. Standard orbicular, with a broad dorsal-wing. Wings broad, laterally 2-lobed, ⅓ in. broad. Lip small, suddenly contracted into a slender up-curved spur, 1½ in. long. Capsule short, oblong, narrowed at both ends.

Upper Guinea. Abbeokuta, *Dr. Irving!* wet places along the banks of the Niger, *Barter!*

8. **I. Kirkii,** *Hook. f.* Herbaceous, tall, simple. Stems rather stout, densely pubescent. Leaves 4–5 in., on short petioles, lanceolate or oblong-lanceolate, acutely serrate, pubescent below. Flowers solitary or in pairs; peduncles 3–4 in., very slender, pubescent. Sepals lanceolate. Wings orbicular, 2-lobed, about ½ in. diam. Lip boat-shaped, pubescent, suddenly contracted into a slender pubescent spur, 1 in. long. Capsule as in *I. Irvingii.*

Var. *a.* Leaves lanceolate, narrowed into the petioles. Stem tomentose.

Mozamb. Distr. Lake Nyassa, western side (Sept.), *Dr. Kirk!*

Var. β. Leaves oblong-lanceolate, very pale beneath, acute or almost rounded at the base. Stem slightly pubescent.

Lower Guinea. Angola, prov. Ambaca, 3000 ft., *Dr. Welwitsch!*

9. **I. Sakeriana,** *Hook. f. in Journ. Linn. Soc.* vii. 185. Herbaceous, glabrous or pubescent above, 6–8 ft. high. Leaves in whorls of 3–8, rarely opposite, 2–6 in., petioles 1–3 in., oblong-lanceolate, crenate or serrate, with short cilia on the teeth or in the crenatures. Flowers 2–8, racemed on the ends of stout peduncles that are longer than the leaves. Bracts small, short, broad. Pedicels slender, ⅜–1 in. Sepals small, broad. Standard short, concave, apiculate. Wings semilunate, scarcely longer than the mouth of the lip, 2-lobed. Lip funnel- or trumpet-shaped, gradually narrowed into a short spur with a swollen tip, together ¾ in. long. Capsule short, acuminate.

Upper Guinea. Camaroons mountain, 7000 ft. (July and Nov.), *Mann!*

10. **I. palpebrata,** *Hook. f. in Journ. Linn. Soc.* vii. 186. Small. Stem 2 in., herbaceous, annual, glabrous. Leaves few, 1 in., alternate, ovate- or oblong-cordate, deeply coarsely crenate, with a few long cilia at the base; petioles ⅓–1 in. Flowers small, purple and green, racemed at the end of a slender, solitary, erect peduncle 3 in. long. Bracts small. Pedicels ¼ in. Sepals minute. Standard small. Wings linear-oblong, pendulous, with small auricles at their bases. Lip shallow, rather suddenly contracted into a short, stout, straight spur ¼ in. long, the tip of which is bent forward and acute. Capsule small, short.

Upper Guinea. Sierra del Crystal (July), *Mann!*

11. **I. hians,** *Hook. f. in Journ. Linn. Soc.* vi. 7. Herbaceous, 2 ft., glabrous. Leaves alternate, distant, 2–4 in., broadly ovate, rounded at the base, shallowly crenate, with cilia in the crenatures and very long ones at the base; petiole very slender, 1–2 in. Flowers dark red and greenish, racemed on axillary rather stout peduncles. Bracts ovate, acute. Pedicels ¾ in. Sepals lanceolate. Standard concave. Wings linear, narrow, notched on the outer margin, as long as the mouth of the lip. Lip with a very oblique mouth, elongate funnel-shaped, straight, ½ in. long, with a short, thick, inflexed tip. Capsule linear.

Upper Guinea. Fernando Po, alt. 1000–2000 ft. (Dec.), *Mann!*

12. **I. macroptera,** *Hook. f. in Journ. Linn. Soc.* vii. 186. Herbaceous, 2–4 ft., glabrous, branched. Leaves alternate, 3–6 in., on slender petioles of 1–2 in., ovate, long-acuminate, rounded or cuneate at the base, crenate with cilia in the crenatures. Flowers large, umbelled at the apex of a peduncle 4–6 in. long. Bracts large. Pedicels short, ¼–¾ in. Sepals dimidiate-ovate. Standard orbicular, apparently horned at the back. Wings very large, 1½–2 in., pendulous, obovate, with suborbicular auricles. Lip broadly obliquely trumpet-shaped, suddenly contracted to a short incurved spur.

Upper Guinea. Fernando Po, 4000–5000 ft. (April); Sierra del Crystal (July), *Mann!*

13. **I. Rothii,** *Hook. f.* Herbaceous, glabrous. Leaves alternate, 4–5 in. long, 2 in. broad, on petioles ½–1 in. long, broadly lanceolate or ovate- or oblong-lanceolate, serrate; nerves diverging. Flowers 3–6, umbelled at the end of stiff, stout, common peduncles 3–6 in. long. Bracts large. Pedicels ¼–½ in. Sepals broadly ovate-oblong. Standard suborbicular, acute. Wings large, broad, pendulous, auricled. Lip trumpet-shaped, gradually narrowed into a stout ascending spur.

Nile Land. Abyssinia, Ankober, in wet, shady places (August), *Roth!*
Flowers very imperfect, perhaps a form of the following.

14. **I. tinctoria,** *Rich. Fl. Abyss.* i. 120. Herbaceous, glabrous, branched; roots tuberous. Leaves alternate, shortly petioled, narrow oblong-lanceolate, serrate; nerves very oblique, almost parallel to the margin. Flowers large, white, 3 or more umbelled at the apex of a stout peduncle 3–4 in. long. Bracts large, ¼ in. broad, oblong. Pedicels ½–1 in. Sepals large, broad, oblong-cordate. Standard ½ in., orbicular, acute. Wings broad, large, pendulous, undulate, subspathulate. Lip broadly conic, tapering into a long, straight, pendulous spur, together 3 in. long. Capsule oblong-clavate. —*I. flagellifera,* Hochst. in Schimp. Pl. Abyss.

Nile Land. Abyssinia, mountains of Sana and Tigre, *Dillon! Schimper!*
The root is used to stain the hands and feet of a reddish colour. Vernacular name, "Ensscsella" (A. Rich. l. c.).

15. **I. abyssinica,** *Hook. f.* Herbaceous, glabrous. Leaves alternate, 3–4 in., on stout petioles of 1 in., ovate-lanceolate, serrate; nerves diverging. Flowers umbelled at the top of stout peduncles 3–5 in. long. Bracts rather large, ⅛ in. Pedicels ¼–½ in. Sepals dimidiate-ovate. Standard concave, orbicular, acute. Wings pendulous, broad. Lip small, short, suddenly contracted to a slender, curved, ascending spur, 1–1½ in. long.

Nile Land. Abyssinia, Ankober, in wet places (July), *Roth!*
Very similar in foliage to *I. Rothii,* but the lip and spur quite different. Possibly both are forms of *I. tinctoria.*

16. **I. Walleriana,** *Hook. f.* Herbaceous, glabrous. Leaves alternate, 2–3 in., petioles ½–1½ in., broadly ovate-acuminate, coarsely serrate, ciliate at the base; nerves diverging. Flowers 2–3, umbelled at the apices of slender peduncles 1–2 in. long. Bracts small, narrow. Pedicels ½–1 in. Sepals lanceolate. Standard oblong-orbicular, acute. Wings large, broad. Lip very small, tapering at once into a slender ascending spur, with a swollen apex, 1½ in. long. Capsule short, swollen in the middle.

Mozamb. Distr. Morambalia, 2000 ft., on stones in streams (Dec.), *Dr. Kirk! and Mr. H. Waller!*

17. **I. filicornu,** *Hook. f. in Journ. Linn. Soc.* vi. 6. Herbaceous, glabrous, a foot or more high. Stem below rooting at the nodes. Leaves alternate, 2–3 in. long, on long slender petioles 1–3 in. long, broadly ovate or ovate-oblong, very shallowly crenate with cilia in the crenatures; nerves diverging. Flowers small, light purple, numerous, umbelled at the apex of long slender 3–6 in. peduncles, which are scarred by the fallen bracts. Bracts imbricate,

boat-shaped. Pedicels very slender, strict, ½–¾ in. Sepals broadly ovate-oblong. Standard orbicular-oblong, acute. Wings spreading, subfalcate; auricles diverging, falcate, ascending; limb laterally lobed. Lip boat-shaped, suddenly narrowed into a very slender nearly straight spur, ⅔ in. long. Capsule ¼ in. long, gibbous, acute.

Upper Guinea. Fernando Po, 4000–5000 ft. (Dec.); Sierra del Crystal (July), *Mann!*

Nile Land. Abyssinia, moist clifts, prov. Semiene (August), *Schimper!*

Mann sends a small rigid form from Sierra del Crystal, with lanceolate leaves, 1–1½ in. long and longer cilia to the crenatures.

I. macrantha, *Hochst.; A. Rich. Fl. Abyss.* i. 121, is unknown to me; it is described as having fibrous roots, alternate elliptic-ovate leaves that are attenuated at the base, toothed, the teeth terminating in a red seta and scattered setæ on the under side, middle-sized axillary solitary or twin flowers, lanceolate sepals and a long slender spur. Can it be a form of *I. capensis?*

Order XXXIII. RUTACEÆ (by Prof. Oliver).

Flowers usually regular, hermaphrodite or polygamous. Sepals 4–5, free or connate. Petals as many, imbricate or valvate. Stamens as many or twice as many as the petals, rarely fewer or more numerous. Disk usually annular or cushion-like, between the ovary and stamens. Ovary 4–5-carpellary; carpels more or less connate, at least in the style, or free, rarely 1-carpellary. Ovules geminate or solitary. Fruit various, separating into as many cocci as carpels or baccate.—Trees shrubs or rarely herbs, usually abounding in immersed glands. Leaves exstipulate, opposite or alternate, simple or compound. Inflorescence various.

A large Family of warm and tropical regions in both hemispheres. Several numerous genera are peculiar to the Cape flora.

Herbaceous. Flowers hermaphrodite. Stamens 8–10. Ovules 3 or more in each cell	1. Ruta.
Shrubs or trees.	
Flowers unisexual. Stamens as many as petals. Carpels distinct in fruit	2. Zanthoxylum.
Flowers unisexual. Stamens as many or twice as many as petals. Carpels consolidated	3. Toddalia.
Flowers hermaphrodite. Stamens twice as many as petals. Fruit indehiscent. Seed exalbuminous	4. Clausena.
[Flowers hermaphrodite. Stamens ∞, polyadelphous. Fruit baccate, multilocular	* Citrus.
The Orange, Lemon, and their allies, cultivated here and there.]	

1. RUTA, Linn.; Benth. et Hook. f. Gen. Pl. i. 286.

Flowers regular, hermaphrodite. Calyx 4–5-lobed, persistent. Petals 4–5, often toothed or fimbriate. Stamens 8–10. Ovary inserted upon a thick urceolate or annular disk, deeply 4–5-lobed, 4–5-celled. Style central. Fruit separating into as many several-seeded cocci as carpels, indehiscent or

opening at the apex. Seeds albuminous.—Herbs, often shrubby below, glandular-punctate. Leaves alternate, often pinnati- or 2-pinnatisect. Flowers in terminal corymbose cymes.

A considerable genus of the Mediterranean region, Atlantic Islands, and Western Asia.

Flowers usually 4-merous. Petals fimbriate. Leaves divided . . . 1. *R. graveolens.*
Flowers usually 5-merous. Petals entire. Leaves undivided (*Haplophytum*) . . . . . 2. *R. tuberculata.*

1. **R. graveolens,** *Linn.; DC. Prod.* i. 710, var. *bracteosa.* Leaves 2-pinnatipartite; segments oval- or oblanceolate-oblong, obtuse. Bracts sessile, ovate or cordate-based, amplexicaul. Petals fimbriate. Filaments glabrous.

Nile Land. Abyssinia, *Dillon and Petit!*
Perhaps only cultivated. Mediterranean region, Syria, etc.

2. **R. tuberculata,** *Forsk.; DC. Prod.* i. 711. More or less prominently gland-tubercled. Leaves undivided, linear, oblanceolate to obovate-cuneate. Petals entire. Filaments pilose.—*Haplophytum*, A. de Juss. in Mém. Mus. xii. 528. t. 17. f. 10.

Nile Land. Nubia, *Schweinfurth! Ehrenberg;* White Nile, *Cienkowski.*
North Africa eastward to Scinde.

2. **ZANTHOXYLUM,** Linn.; Benth. et Hook. f. Gen. Pl. i. 297.

Flowers polygamous (or dicœcious?). Calyx 4–5-fid or -partite; segments imbricate. Petals 4–5, free, imbricate or valvate. Male fl.: Stamens as many as and alternate with the petals, hypogynous. Ovary rudimentary. Female fl.: Stamens 0 or scale-like. Carpels 1–5, oblique, each 1-celled, usually biovulate. Fruit of 1–5 cocci, dry or drupaceous, usually opening in 2 valves, 1-seeded. Seeds with a crustaceous or bony testa and straight or curved embryo in the axis of a fleshy albumen.—Shrubs or trees, glabrous or pubescent, with or without prickles. Leaves alternate, imparipinnate, 3- or 1-foliolate; leaflets articulate, entire or crenulate, glandular-dotted. Flowers small, white or greenish, in terminal and axillary panicles. Fruit, often the entire plant, aromatic or pungent.

A considerable tropical genus. The following species appear to be endemic.

Flowers sessile, 5-merous. Leaves multifoliolate, 2–3 ft.; leaflets 5–8 in. long . . . . . 1. *Z. macrophyllum.*
Flowers sessile. Leaves 5–9-foliolate; leaflets obovate-oblong, obtuse or broadly apiculate . . . . . 2. *Z. senegalense.*
Flowers equalling the pedicels. Leaves 5–9-foliolate; leaflets elliptical, acuminate, 4–5 in. by 2½ in. . . . . 3. *Z. melanacanthum.*
Flowers equalling the pedicels, usually 4-merous. Leaves multifoliolate; leaflets oval, acuminate, 2–3 in. by 1–1½ in. . . . 4. *Z. rubescens.*
Flowers 5-merous. Leaves 13–15-foliolate, rachis 5–8 in.; leaflets ovate-lanceolate, 1–2 in. by ½–½ in. . . . . 5. *Z. Leprieurii.*

1. **Z.? macrophyllum,** *Oliv.* A glabrous tree of 30–40 ft. Prickles

of extremities and common petiole spreading or ascending. Leaves multifoliolate, 2–3 ft. or more in length; leaflets rather coriaceous, shortly petiolulate, oblong or varying from ovate to oblong-lanceolate, shortly and rather abruptly acuminate, very oblique at the base, semi-cordate or one side broadly rounded; 6–8 in. long, 2½–3 in. broad. Male fl. very numerous, in large pyramidal branching panicles 1–2 ft. long collected toward the extremities of the branches, in the axil of lanceolate bracts ½–1 in. long; minute, 5-merous, sessile or subsessile. Petals slightly imbricate. Rudiment of the pistil subulate, upon a thickened disk. Female flower and fruit not seen.

Upper Guinea. Prince's Island, *Mann!*

2. **Z. senegalense,** *DC. Prod.* i. 726. A glabrous shrub or tree attaining 20 ft. Prickles of the extremities and common petiole usually more or less recurved, acute. Leaves 5–9-foliolate; leaflets alternate or subopposite, petiolulate, rather coriaceous, obovate-oblong or elliptic-oblong, apex rounded and very shortly and broadly apiculate depressed or retuse, cuneate-rounded at the base, 2–3½ in. long, 1–1½ in. broad; petiolules articulated, ⅛ in. or less. Flowers small, white, sessile; in terminal branching panicles or in the axils of the uppermost leaves 3–6 in. long or more. Male flowers pentamerous. Petals imbricate. Rudiment of pistil subulate, upon a thickened central disk. Fruits rather crowded, in paniculate clusters shorter than the leaves, 1-carpellary, 1-seeded. Seeds shining, blue-black.—*Fagara zanthoxyloides,* Lam. Encycl. ii. 446. *Zanthoxylum polygamum,* Schum. et Thonn. Guin. Pl. 433 (ex descr.).

Upper Guinea. Senegal, *Perrottet!* Cape Coast, *T. Vogel!* Niger, *Barter!*

3. **Z. melanacanthum,** *Planch. in Herb. Kew.* Glabrous. Prickles strong, straight, acute. Leaves apparently 5–9-foliolate; leaflets membranous, elliptical, shortly and rather abruptly acuminate, rounded at the base, broadly crenulate, 4–5 in. long, 2½ in. broad, subsessile or very shortly petiolulate. Female flowers in terminal, minutely puberulous panicles, shorter than the leaves in our specimens. Flowers 4-merous, equalling the pedicels. Sepals minute, rotundate. Petals oblong-lanceolate, at length revolute above. Carpel solitary. Male flower and mature fruit not seen.

Upper Guinea. Sierra Leone, *T. Vogel! Afzelius!*

4. **Z. rubescens,** *Planch. in Fl. Nigrit.* 270. A glabrous prickly shrub of 6 ft. Branches reddish, with acute recurved prickles. Leaves pinnate, 8–10 in., common petiole aculeolate; leaflets "about 11," broadly oval or oblong-elliptical with a narrow obtuse acumen, cuneate or rounded at the base, entire or obsoletely serrulate above, 2–3½ in. long, 1–1½ in. broad. Male flowers whitish, in large, many-flowered, somewhat pyramidal, minutely puberulous, terminal panicles; tetramerous. Pedicels slender, about equalling the flower. Sepals minute, rotundate, ciliolate. Petals rather thin, elliptic-lanceolate, slightly imbricate. Rudiment of ovary minute. Female flower and fruit not seen.

Upper Guinea. Cape Coast, *T. Vogel!* (? Sierra Leone, *Afzelius.*)

5. **Z. Leprieurii,** *Guill. et Perr. Fl. Seneg.* i. 141. Branches rigid, terete, prickly. Leaves 13–15-foliolate, glabrous; leaflets ovate-lanceolate, acuminate, narrowed to the base, denticulate, shining above, paler beneath, sessile, 1–2 in. long, 4–6 lines broad; common petiole 5–8 in., aculeate. Flowers (female only known) small, in terminal spicate racemes. Sepals 5, minute, roundish. Petals 5, much longer than the sepals, ovate-oblong, obtuse, subemarginate, reflexed. Ovary 1–2-ovulate, ovoid-oblong. Style lateral, incurved.

Upper Guinea. Senegambia, *Leprieur.*

Zanthoxylum Leprieurii I have failed to identify amongst our collections.' It was described from incomplete specimens with pistillate flowers only, so that possibly *Z. rubescens*, to which it is evidently nearly allied, may prove to be the same, though differing apparently in the symmetry of the flowers.

The "*Zanthoxylum?*" referred to in Fl. Nigrit. 271, from Cape Palmas (*Ansell*) is impossible to identify and not worth describing.

3. TODDALIA, Juss.; Benth. et Hook. f. Gen. Pl. i. 300.

Nearly as in *Zanthoxylum*. Flowers unisexual. Petals imbricate or valvate. Male fl.: Stamens 2, 4, 5, 8, or 10. Female fl.: Ovary 2–5(–7)-celled, rarely 1-celled, entire. Fruit fleshy or coriaceous, 2- or more celled. —Shrubs, often scandent, with or without prickles. Leaves alternate, 3-foliolate; leaflets glandular-dotted.

A small genus of the warmer regions of the Old World.

Unarmed. Leaflets elliptic-oblong, acuminate. Panicles axillary and terminal. Stamens 4. Petals valvate. Ovary 1-celled	1. *T. nobilis.*
Unarmed. Leaflets elongate-oval. Panicles terminal. Stamens 8. Ovary normally 4-celled	2. *T. lanceolata.*
Prickly. Leaflets oblanceolate or broadly oval, obtuse. Ovary 5-celled	3. *T.? sp.*

1. **T. nobilis,** *Hook. f. in Gen. Pl.* i. 301. Glabrous with pale green, terete, unarmed extremities. Leaflets rather coriaceous, elongate, oblong-oval or oblanceolate-oval, acute, more or less acuminate, narrowed to the base and shortly petiolulate, entire or obsoletely undulate-denticulate above, 5–6 in. long, 1–1¾ in. broad, on petioles 1–2 in. Male flowers 4-merous, sessile, subglomerulate, minutely bracteolate, in axillary and terminal alternately branching panicles shorter than the leaves. Calyx-lobes short, broadly rounded, submucronulate. Petals oblong, imbricate, rather thick. Stamens 4. Female flowers in axillary spikes shorter than the petioles. Ovary 1-celled with a sessile, peltate, rounded, entire stigma.—*Teclea nobilis*, Delile in Ann. Sc. Nat. Sér. 2. xx. 90; Rich. Fl. Abyss. Atlas. t. 28. *Aspidostigma acuminatum*, Hochst. in Flora, 1844, 18.

Nile Land. Abyssinia, in deep, narrow, alpine valleys, *Schimper!*

A plant nearly allied to the above, with short axillary panicles of male flowers only, is in the Kew Herbarium from the Sugarloaf mountain, Sierra Leone (*Barter*). It is probably distinct, but insufficient for description.

2. **T. lanceolata,** *Lam.; DC. Prod.* ii. 83. A glabrous, unarmed, small tree or shrub. Leaflets rather coriaceous, ternate, elongate-oval or oval-lanceolate, subacute or rather obtuse, often much narrowed to the base, obsoletely undulate, with looping veins, 3–4 in. long, ¾–1 in. broad, sessile or subsessile at the extremity of an exalate petiole of 1–2 in. Flowers 4-merous, equalling or exceeding the pedicels, in terminal alternately branching panicles shorter than the leaves. Calyx broadly 4-lobed; lobes rotundate-deltoid. Petals slightly imbricate. Male fl.: Stamens 8, rudiment of the ovary 4-fid. Fruit normally 4-celled, 4-seeded, 4-lobed or -furrowed while immature, at length distinctly fleshy; about ¼ in. diam. when dry. Testa crustaceous, black, thicker on the ventral side.—*Vepris querimbensis,* Klotzsch in Peters' Mossamb. Bot. 87.

Mozamb. Distr. Right bank of the Luabo and mouth of the Zambesi, *Dr. Kirk!* Mozambique, *Peters!*

Also at the Cape and in Mauritius. See Harvey in 'Flora Capensis,' i. 447.

3. **T.? sp.** Prickles very short, recurved. Leaflets oblanceolate or broadly oval, narrowed to the obtuse apex or shortly and obtusely acuminate, obscurely crenulate-dentate above with very narrowly revolute margins when dry, midrib occasionally with 2 or 3 minute curved prickles; 1½–2 in. long, ¾ in. broad more or less. Petiole ½ in., pubescent on the inner side. Flowers in short axillary racemes (?), pedicellate. Calyx minute, thick, 5-lobed. Ovary 5-celled; ovules apparently geminate. Young fruit baccate, 2–3-celled. (Aff. *T. aculeatæ?*)

Nile Land. Ankober, Abyssinia, *Roth!*

Our single specimen hardly suffices to enable me to determine this plant.

4. **CLAUSENA,** Burm.; Benth. et Hook. f. Gen. Pl. i. 304.

Flowers hermaphrodite. Calyx 4–(5-)lobed. Petals 4 (5), slightly imbricate. Stamens 8 (10), free. Ovary 4–(5-)3-celled. Style at length separating. Ovules geminate, collateral or superimposed. Berry 1–4-celled, 1 4-seeded. Seed exalbuminous.—Trees or shrubs, unarmed. Leaves unequally pinnate. Flowers in axillary or terminal panicles or racemes.

A small genus chiefly confined to India and the Archipelago. The two following species are nearly allied to the Indian *C. Willdenovii.*

Small tree, 10–20 ft. Leaves 3 6(10) in. Flowers collected in 3-flowered cymes or solitary along the raceme . . . . . 1. *C. inæqualis*
Undershrub, 3–10 ft. Leaves ½ 1 ft. Flowers in several- or many-flowered paniculate cymes . . . . . 2. *C. anisata.*

1. **C. inæqualis,** *Benth. Fl. Nigrit.* 257. A shrub or small tree of 10 20 ft. Extremities puberulous or nearly glabrous. Leaves 9–17-foliolate, 3 6 rarely 10 in. long; leaflets alternate, ovate-oblong or varying from ovate to lanceolate or elliptical, obtuse, often narrowed to the apex or obtusely acuminate, crenulate, the lateral oblique, shortly petiolulate, ½ 2 in. rarely 3 4 in. long. Flowers white, in axillary compound or simple racemes

shorter than the leaves. Pedicels 1–2 lines. Berry 1-seeded, the size of a pea.

Upper Guinea. Cape Coast, *T. Vogel!* Camaroons mountain, *Mann!* (7000 ft.)
A very variable plant as to foliage. It is common at the Cape.

2. **C. anisata,** *Oliv. in Journ. Linn. Soc.* v., *Suppl.* 34. An undershrub of 3–7 ft. Leaves ½–1 ft.; leaflets 10–20, ovate or ovate-oblong, often acuminate obtuse or subacute, crenulate, more or less pubescent at first. Flowers in axillary panicles of 4–10 in.; lateral peduncles spreading or ascending, bearing several- or many-flowered cymes. Pedicels 1–3 lines. Berry 1-seeded.

Upper Guinea. Abbeokuta, *Irving!* Niger, *Barter!* Old Calabar, *Thomson!*

The *Glycosmis? africana* of Fl. Nigrit. 256, is represented by a specimen too imperfect for description or determination, gathered in St. Thomas by Don.

Order XXXIV. SIMARUBEÆ (by Prof. Oliver).

Flowers unisexual or hermaphrodite, regular. Calyx 3–5-fid or -partite, or sepals free. Petals as many. Stamens as many as petals or twice or thrice as many. Filaments free, naked, pilose or with an adnate scale. Anthers rotundate to linear. Ovary deeply 3–5-lobed, or carpels distinct, or ovary entire 2–5-celled, usually inserted upon a thickened fleshy disk. Styles free or connate or simple and terminal in the undivided ovaries. Ovules solitary or geminate. Fruit various, dry or drupaceous. Seeds with or without albumen; embryo straight or curved.—Shrubs or trees, usually characterized by a bitter principle. Leaves alternate, pinnate, 2-foliolate or simple, rarely stipulate. Inflorescence various, axillary or terminal. Flowers usually rather small.

A considerable Natural Order, chiefly tropical or subtropical, represented both in the Old and New World. Four of the nine African genera are peculiar to this continent.

Ovary deeply lobed or carpels distinct (*Simarubeæ*).
- Leaves pinnate.
  - Flowers unisexual.
    - Stamens twice as many as petals. Calyx closed at first . . . 1. Hannoa.
    - Stamens as many as petals. Calyx 4–3-partite . . . . . 2. Brucea.
  - Flowers hermaphrodite.
    - Stamens as many as petals . . . . . 3. Kirkia.
    - Stamens twice as many as petals.
      - Petals subvalvate. Style short . . . . . 4. Harrisonia.
      - Petals broadly imbricate, linear. Style elongate . . . . . 5. Quassia.
    - Stamens three times as many as petals . . . . . 6. Mannia.
- Leaves simple. Carpels 5, free . . . . . 7. Suriana.

Ovary entire (*Perameæ*).
- Leaves simple. Ovary 2-celled . . . . . 8. Irvingia.
- Leaves 2-foliolate. Ovary 5-celled . . . . . 9. Balanites.

1. HANNOA, Planch.; Benth. et Hook. f. Gen. Pl. i. 308.

Flowers unisexual. Male fl.: Calyx at first closed, opening in 2 or more

segments. Petals 5, oblong or elliptic-lanceolate, pubescent, with imbricate margins. Stamens 10; filaments filiform with a narrow, adnate, pilose scale on the inner face. Rudiments of the carpels immersed in a raised, sulcate, glabrous, central disk. Female fl.: "Carpels 5–6. Styles connate. Drupes 1–6," oblong, indehiscent, with a woody or bony endocarp, 1-seeded. Seed conformable. Cotyledons fleshy, plano-convex, with a minute radicle. —A small glabrous tree. Leaves alternate, unequally pinnate; leaflets coriaceous, opposite or alternate, often on long petiolules. Flowers small, white, fragrant, in terminal alternately branched panicles.

A genus of one, or perhaps two, species, peculiar to W. tropical Africa. I have only seen male flowers and fruit.

1. **H. undulata,** *Planch. in Lond. Journ. Bot.* v. 566. Leaflets very coriaceous, obovate- or elliptic-oblong, retuse minutely apiculate or obtuse, subentire, narrowed or cuneate at the base, venation obscure, 2–4 in. long, 1–2 in. broad or occasionally larger. Petiolules 1 in. or less; common petiole about 6 in. Panicles equalling or shorter than the leaves. Drupes ¾–1 in. long, ½ in. diam.—*Simaba? undulata,* Guill. et Perr. Fl. Seneg. i. 136. t. 34.

Upper Guinea. (Petiolules near 1 in.) Senegambia! Niger, *Barter!* (petiolules about ¼ in.) Mouth of the Niger, *Mann!*

Excepting the length of the petiolules, I see no noteworthy character separating these two forms, which are referred to as distinct species in the 'Genera Plantarum.'

2. BRUCEA, Mill.; Benth. et Hook. f. Gen. Pl. i. 311.

Flowers polygamous. Calyx 4- rarely 3-partite. Petals 4, rarely 3, elliptical. Stamens usually 4, outside the disk, in the female flowers effete or smaller; filaments naked; anthers rotundate, unappendaged. Female fl.: Carpels 4, cohering at the top of the ovaries, each with a spreading or recurved style. Ovules solitary, attached above the middle. Drupes 4 or fewer, ovoid, with a thin, scarcely fleshy pericarp. Seed conformable to the pericarp, exalbuminous, the cotyledons fleshy, plano-convex, sometimes cohering.—Trees. Leaves alternate, imparipinnate, exstipulate. Flowers spicate or in elongate narrow panicles, very small.

A small genus of tropical and subtropical regions of the Old World. The following species are confined to Africa.

Leaves more or less pubescent, 8–20 in.; leaflets 2–4 in. ♂ fl. in interrupted spikes . . . . . 1. *B. antidysenterica.*
Leaves 3 ft., soon glabrous; leaflets ample, 6–8 in. ♀ fl. in elongate panicles . . . . . 2. *B. macrophylla.*

1. **B. antidysenterica,** *Mill.; DC. Prod.* ii. 88. A small tree, reaching sometimes 15–20 ft. Extremities pubescent or tomentose. Leaves 8–20 in. long; leaflets opposite or subopposite, ovate ovate-lanceolate to lanceolate, occasionally broadly oblong, acute or very shortly acuminate, entire or undulate-toothed, softly pubescent on both surfaces at first, at length more or less glabrescent at least above, older leaves often coriaceous, 2–4 in. long, ¾–1½ in. broad. Petiolules 1–3 lines. Male flowers in interrupted, elon-

gate, pilose-tomentose spikes 4–10 in. long, from the axils of the uppermost leaves; very small, sessile or subsessile, clustered in the axils of minute bracts. Female flowers apparently pedicellate. Drupes about ½ in. long.—*B. ferruginea*, L'Hér. Stirp. Nov. t. 10.

Upper Guinea. Camaroons mountain, 7–8000 ft., *Mann!*
Nile Land. Abyssinia, *Schimper!* (with oblong leaflets) *Plowden!*

2. **B. macrophylla,** *Oliv.* A small tree of 10–15 ft. Leaves about 3 ft.; leaflets in about 4–6 pairs, ample, membranous, opposite, petiolulate, ovate-oblong or broadly oblong-elliptical, acute or acuminate, entire or undulate, early nearly or quite glabrous, or the midrib minutely pubescent, 6–8 in. long, 2½–4 in. broad; petiolules ½ in.; rachis terete, shortly pilose at first. Female flowers small, red, in elongate, narrow, rusty-pubescent panicles of ½–1½ ft. from the axils of the leaves of the terminal tufts. Lateral branches of the panicle ½–3 in., spreading. Flowers subsessile or equalling the pedicels. Petals ovate, entire or slightly toothed, a little exceeding the sepals. Carpels cohering at the top of the ovaries. Styles spreading or recurved. Drupes obliquely ovate-oblong, wrinkled when dry. Seeds exalbuminous.

Upper Guinea. Sierra Leone, *Don!* Corisco island and Ambas Bay, *Mann!*

At first I was disposed to regard this plant as the *Brucea paniculata* of Lamarck, a species briefly noticed, and without diagnosis, in the Encycl. (i. 472), but on reference to Smeathmann's specimens in the Herbarium of the British Museum, I find this plant can scarcely be regarded as belonging to the genus *Brucea*. I have only seen staminate flowers, so that I am uncertain to which Natural Order to refer it. It may prove a *Burseracea* or *Anacardiacea* near to *Soriudeia*. It is at once to be distinguished from *Brucea* by its minute calyx, three to four times shorter than the petals. So far as the material enables me, it may be described:—Leaves 9–18 in., 9–11-foliolate; leaflets coriaceous, oblong-lanceolate or varying from ovate-lanceolate to oblong, rather obtusely acuminate, all except the broadest more or less narrowed to the base, glabrous, 2–6 in. long, ¾–2 in. broad; petiolules 2–3 lines. Panicles (of ♂ fl.) terminal or from the upper axils, many-flowered, more or less pyramidal, often exceeding the leaves, thinly rusty-pubescent. Pedicels slender, equalling the flower. Calyx minute, 4-lobed. Petals 4, ovate-elliptical, sessile, valvate in æstivation. Stamens 4 with naked subulate filaments and ovate-elliptical dorsifixed anthers, inserted around the 4-gonous pilose disk.—Sierra Leone, *Smeathmann!* West Africa, *Don!* (leaves only.) *Brucea guineensis*, Don, Gen. Syst. i. 801, I take to be the same.

3. KIRKIA, Oliv., gen. nov.

Flowers hermaphrodite or polygamous. Calyx broad-based, 4-partite; segments ovate. Petals 4, oblong-lanceolate, much exceeding the calyx, at length patent; margins involute. Stamens 4, alternate with the petals, inserted around a fleshy tetragonous disk; filaments filiform, unappendaged, glabrous; anthers ovate-oblong, muticous, 2-celled, dehiscing longitudinally, attached dorsally a little above the base. Ovary (very small) deeply 4-lobed, 4-celled, glabrous; styles distinct, very short; stigmas simple. Ovules solitary (perhaps sometimes 2?), inserted in the inner angle, very minute. Fruit dry, oblong, tetraquetrous, separating at length in 4 linear-oblong, glabrous, 1-seeded, indehiscent cocci, notched above, entire or emarginate at the base, suspended by the apex from a central carpophore; epicarp thin; endocarp coriaceous or somewhat bony, fibrous in decay. Seed exalbuminous; testa papery. Cotyledons fleshy, linear-oblong, com-

planate, emarginate at base, much exceeding the tapering, subacute, superior radicle.—A glabrous tree. Leaves usually somewhat clustered at the ends of the branches, alternate, multifoliolate, exstipulate; leaflets subopposite or alternate, obliquely lanceolate, finely acuminate, serrulate. Flowers in numerous, pedunculate, cymose corymbs from the axils of the upper leaves, forming a broad leafy panicle; pedicellate, pedicels equalling or shorter than the flowers.

But one species known, restricted to Zambesi-land, where it was discovered by Dr. Kirk, to whom we are indebted for so many important additions to our knowledge of the natural history of that region. I am glad to have the opportunity of associating his name with a plant, discovered by himself, and of peculiar botanical interest.

1. **K. acuminata,** *Oliv.* Extremities terete, smooth, glabrous, rather stout, from the thickness of a goose-quill to ⅛ in. in diam. Leaves ½–1 ft. long; leaflets 13–19, approximated in pairs, shortly petiolulate, lanceolate to ovate-lanceolate, with a free acumen, base very oblique, the upper margin being broadly rounded or semicordate, broadly serrulate, glabrous, firmly membranous, epunctate, 1¾–3 in. long, ¾–1 in. broad; petiolule 1–2 lines. Peduncles straight, rather rigid, unbranched to 2–4 in., then at first more or less 3-chotomously divided with ascending divergent branches. Flowers, before expansion, about 2 lines long. Fruit ½ in. long, 2½–3 lines broad. Carpophore continuous to the apex, often persistent with its 4 hooked apices after the fall of the cocci.—Hook. Ic. Pl. 1036.

Mozamb. Distr. Zambesi, at Lupata, and near Senna, *Dr. Kirk!* (flower in Dec., fruit April).

In all the flowers which I have examined of this plant, I find the ovary very minute, especially so in those in which the stamens appear to be fully developed.

4. **HARRISONIA,** Brown; Benth. et Hook. f. Gen. Pl. i. 314.

Flowers hermaphrodite. Calyx 5–4-fid or -partite, small. Petals as many as calyx-lobes, considerably longer, slightly imbricate or subvalvate. Stamens twice as many as petals; filaments with an adnate pilose scale. Ovary 5–4-lobed (in the African plant), inserted upon a fleshy disk; style simple; stigma 5-toothed. Ovules solitary, pendulous. Fruit small, subglobose (in the Indian specimens), with 4–5 bony 1-seeded pyrenes. "Seeds albuminous. Cotyledons conduplicate."—Glabrate or pubescent shrubs, usually with lateral aculei by the insertion of the leaves. Leaves imparipinnate; leaflets opposite. Flowers rather small, in axillary or subterminal cymes, sometimes racemose.

A small genus, restricted, with the following exception, to the Malay Archipelago and Australia. Its affinity appears to be with the tribe *Simarubeæ*.

1. **H. abyssinica,** *Oliv.* A shrub. Annual shoots pubescent. Prickles very short, more or less hooked. Leaves 2–3 in. long; leaflets in about 3 pairs, obovate-elliptical or oval, obtuse, remotely dentate-serrate (1–3 teeth on each side) or occasionally lobed, base cuneate and oblique in the sessile lateral leaflets, usually narrowed into a winged petiolule in the terminal one, rather coriaceous, glabrous or glabrate, excepting on the midrib beneath

which is more or less pilose-pubescent at first; lateral leaflets ½–¾ in. long; common petiole winged between the pairs of leaflets, pubescent beneath. Cymes few-flowered, racemose in the axils of, and shorter than or equalling, the uppermost leaves. Calyx 5-partite, with ovate pubescent lobes. Petals elliptical, subvalvate, puberulous outside. Stamens 10; filaments with an adnate, entire, pilose scale. Ovary 5-lobed, with a short central simple style and 5-toothed stigma. Fruit not seen.

Nile Land. Madi, White Nile, *Speke and Grant!*

Very nearly allied to *H.* (*Lasiolepis*) *paucijuga*, which differs principally in its longer style, more capitate stigma, and less distinctly lobed or merely sulcate ovary. The relative length however of style and stigma appears variable in the Malayan plant, the difference being probably sexual.

5. QUASSIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 308.

Flowers hermaphrodite. Calyx small, 5-partite; lobes imbricate. Petals 5, many times longer than the calyx, erect or ascending, broadly imbricate. Stamens 10; filaments filiform or linear, with an adnate pilose scale. Ovary 5-lobed; lobes free, inserted upon a fleshy disk; styles united throughout; stigma obtuse, subcapitate or 5-sulcate. Ovules solitary, pendulous. Drupes 5 or fewer.—Glabrous trees, with an intensely bitter taste. Leaves alternate, imparipinnate; lateral leaflets opposite. Racemes terminal, simple or branched.

The only other species, the well-known Bitter-wood, is tropical American. It differs from the African plant in its much larger flowers, longer filaments, glabrous ovary, the broadly alate rachis of the leaves, etc.

1. **Q. africana,** *Baillon in Adans.* viii. 89. Eight or twelve feet in height, perfectly glabrous. Leaves 5–7–9-foliolate, 1 ft. or more in length; rachis slightly margined, 3–4 in. to the first pair of leaflets. Leaflets rather coriaceous, oblong-elliptical with a very narrow obtuse acumen, rather oblique at the base and narrowed to the rachis; terminal leaflets equalling or scarcely larger than the lateral ones, more gradually narrowed above and below, 4–5 in. long, 1½ 2 in. broad. Inflorescence terminal, racemose, 2½–4 in. long. Flowers about ½ in. long, rather crowded and fascicled 2 or 3 together or on very short lateral peduncles; bracts minute, triangular; pedicels much shorter than the flower. Calyx-lobes rotundate, ciliolate. Petals linear-oblong, ascending, free. Lobes of the ovary free, pubescent; disk scarcely as broad as the ovary. Fruit not seen.—*Simaba africana*, Baill. in Adans. vii. 381.

Upper Guinea. Camaroons river, *Mann!* Gaboon, *Duparquet.*

The description is based on Mr. Mann's specimens, the leaves of which are 7–9-foliolate.

6. MANNIA, Hook. f.; Benth. et Hook. f. Gen. Pl. i. 309.

Flowers hermaphrodite. Calyx 5-partite; lobes orbicular, imbricate. Petals 5, oblanceolate-oblong, obtuse, rather fleshy, imbricate. Stamens 15; filaments narrow-linear, with a short, adnate, pilose, narrow scale near the middle; anthers linear. Disk flattish, fleshy, within the stamens. Ovary of

5 distinct, carinate, glabrous lobes; styles connate; stigma terminal, 5-lobed. Ovules solitary. Fruit not seen.—Glabrous tree of 20–40 ft. Leaves large, pinnate, multifoliolate. Flowers pedicellate, fasciculate in interrupted elongate racemes apparently collected near the extremity of the branches, purple.

Based upon the following endemic species.

1. **M. africana,** *Hook. f. in Gen. Pl.* i. 309. Leaves 2–3 ft. long; leaflets coriaceous, broadly oblong, rounded at each end, apex retuse or very obtuse, with a short abrupt apiculus, glabrous, midrib prominent beneath, reticulation impressed when dry, 4–6 in. long, 2–3 in. broad; petiolules 1–2 lines. Racemes ½–1½ ft. long. Pedicels ¼ in. or shorter, clustered at intervals. Flowers about ½ in., glabrous.

Upper Guinea. Nun river and Old Calabar, *Mann!*

7. SURIANA, Linn.; Benth. et Hook. f. Gen. Pl. i. 313.

Flowers hermaphrodite. Calyx 5-partite; segments lanceolate, acute, imbricate, persistent. Petals 5, imbricate, equalling or shorter than the calyx. Stamens 10(–8); filaments pilose below; anthers elliptical or rotundate, unappendaged (5 sometimes anantherous). Carpels 5, free; ovaries pilose; styles distinct, lateral, filiform; stigmas obtuse. Ovules geminate, collateral, ascending. Fruit-carpels 1-seeded. Seeds exalbuminous; embryo hooked. —A maritime shrub. Leaves alternate, often crowded, linear-spathulate, obtuse or rather acute, entire, rather fleshy, veinless. Flowers in few-flowered fascicles or corymbs at or near the extremity of the branches equalling or shorter than the leaves, yellow.

Based upon a solitary species, frequent on the seacoasts of tropical countries. It wants the bitterness generally characteristic of the family.

1. **S. maritima,** *Linn.; DC. Prod.* ii. 91. A much-branched shrub, with terete velvety or shortly pubescent branches. Leaves about 1 in. (¾–1¼ in.), usually rather closely tufted towards the ends of short, ascending, lateral shoots, more or less pubescent. Fruit-carpels shorter than the persistent sepals.

Mozamb. Distr. Mozambique, *Dr. Peters!* Europa Island, *Spcke!*

8. IRVINGIA, Hook. f.; Benth. et Hook. f. Gen. Pl. i. 314.

Flowers hermaphrodite. Calyx small, 5-(3–4-)partite; lobes rounded. Petals as many, broadly imbricate, exceeding the calyx. Stamens 10 (or fewer), inserted under a thick fleshy, sulcate or plicate, hypogynous disk; filaments filiform, unappendaged; anthers small, rotundate. Ovary ovoid, compressed, glabrous, inserted upon a broad disk; style simple, terminal, filiform or subulate; stigma simple, obtuse. Ovules solitary. Fruit rather large, drupaceous, 1-seeded; pericarp woody or with a fleshy epicarp. Seed exalbuminous (or albuminous in *I. Smithii?*). Cotyledons large, plano-convex; radicle very small, included in the sinus, "superior" (*I. Barteri*). —Glabrous trees. Leaves alternate, usually more or less coriaceous, simple, entire, petiolate, with narrow, early deciduous, convolute stipules, leaving

annular scars. Flowers yellowish, pedicellate, in terminal or axillary paniculate or fascicled racemes, ebracteate.

Confined to W. tropical Africa.

Leaves broadly elliptical, cuneate or rounded at the base. Racemes axillary, divaricate, fasciculate or panicled, shorter than the leaves; pedicels usually fascicled, 2–5 together . . . . . 1. *I. Barteri.*

Leaves very coriaceous, ovate-elliptical, broadly rounded at the base, with a narrow cordate sinus at the petiole. Flowers numerous, in panicled racemes, terminal or axillary; pedicels singly inserted . . . . . 2. *I. Smithii.*

1. **I. Barteri,** *Hook. f. in Linn. Trans.* 23. 167. A tree of 30–50 ft., glabrous in all its parts; ramuli usually sulcate when dry. Leaves coriaceous, shining above, elliptical or oblong-elliptical, shortly acuminate or apiculate, more or less acute, base cuneate or rounded in the broader-leaved forms, 3–4½ in. long, 1½–2½ in. broad; petiole ¼–½ in. Flowers in axillary panicles or loose subfasciculate, divaricate, few- or several-flowered racemes, usually much shorter than the leaves; pedicels 1–3 lines, often 2–5 together. Calyx 5- occasionally 3–4-partite, with rotundate lobes. Petals broadly elliptical. Style filiform. Fruit "edible," about 2½ in. diam., with a fleshy epicarp and bony endocarp.—*Mangifera gabonensis,* A. Le Comte in Journ. Pharm. et Chim. xxxi. 275.

Upper Guinea. Prince's Island, *Barter! Mann!* Rivers Muni and Camaroons, *Mann!*

Var. *tenuifolia.* Leaves thinly coriaceous or submembranous, broadly elliptical or ob-ovate-elliptical, obtuse or shortly and broadly apiculate.—*I. tenuifolia,* Hook. f. l. c,

Abbeokuta, *Irving!*

Barter calls this the "Wild Mango" of the "Sierra Leone people." I have not seen specimens from Sierra Leone. In the var. *tenuifolia* the style in uninjured flowers is slender and elongate as in the type.

2. **I. Smithii,** *Hook. f. l. c.* A perfectly glabrous tree of 40 ft. (*Barter*), ultimate branchlets usually slightly furrowed when dry. Leaves very coriaceous, ovate-elliptical, acute or broadly pointed, broadly rounded at the base and usually more or less narrowly cordate at the insertion of the petiole, 2½–4 in. long, 1¾–2½ in. broad; petiole ½ in. Flowers numerous, pale yellow, fragrant, "in spreading axillary and terminal subpaniculate, narrow racemes, equalling or exceeding the leaves." Pedicels singly inserted along the rachis, patent, equalling the flowers. Style about equal to the ovary at flowering. Fruit oblong (in our dried specimens), nearly 1½ in. long, with a thick woody pericarp. Seed, according to M. Baillon (Adans. vii. 381), albuminous.

Upper Guinea. Niger, *Barter!*
Lower Guinea. Congo, *Smith!*

Mr. Barter says the fruit is much sought after by monkeys.

9. **BALANITES,** Delile; Benth. et Hook. f. Gen. Pl. i. 314.

Flowers hermaphrodite. Sepals 5, with imbricate margins, deciduous. Petals as many. Stamens 10; filaments unappendaged; anthers dorsally affixed. Ovary globose, pilose, 5-celled, inserted upon a thick fleshy disk;

style simple, terminal. Ovules solitary. Fruit a drupe, 1-seeded, with a bony or crustaceous putamen. Seed "exalbuminous; embryo with thick plano-convex, corrugate or 2-lobed cotyledons and a superior radicle."—Shrubs or small trees, usually armed, at least when young or stunted, with axillary or supra-axillary spines. Leaves 2-foliolate; leaflets entire, coriaceous. Flowers greenish, in axillary fascicles or short racemose cymes.

A genus of two or three species, confined to the warmer parts of Africa and Asia.

1. **B. ægyptiaca,** *Delile; DC. Prod.* i. 708. Extremities terete, minutely hoary-puberulous or glabrate; spines various, usually about ½–1 in., sometimes 3 in., often wanting on fully grown trees, straight, ascending or patent. Leaflets elliptical or varying from ovate- to obovate-elliptical or rotundate, obtuse or broadly pointed, ½–1½ in. long, shortly petiolulate; petiole usually much shorter than the leaflets. Ovary soon lengthening out after flowering, narrowed into the style. Drupe edible, with a thick bony putamen; the seed affording an oil.

Upper Guinea. Niger, *Barter!*
North Central. Bornou (fide *Brown in Denh. and Clapp. App.* 232).
Nile Land. Upper Nile, Abyssinia, Sennar, *Schimper! Roth! Kotschy!* and others.

Var. *angolensis*, Welw. mss. Fruit ellipsoidal, terete, about 1 in. long, with a thin crustaceous endocarp.

Lower Guinea. Loanda, Angola, *Dr. Welwitsch!*

The fruit of this variety differs so remarkably from that of the ordinary form, that this plant may probably be specifically distinct. I do not detect any difference, however, in the flower.

A fragment in the Kew Herbarium, from the Rovuma river (*Dr. Kirk*), without flowers, bears forked spines. It may belong to a distinct species. It is described as a climbing shrub.

Order XXXV. OCHNACEÆ (by Prof. Oliver).

Tribe Ochneæ.

Flowers regular, hermaphrodite. Sepals 5, free, imbricate, scarious or coriaceous. Petals as many, free, equalling or exceeding the sepals, subsessile or unguiculate, contorted or imbricate. Stamens 10 or indefinite; filaments frequently persistent, free. Anthers linear, often elongate or oblong, basifixed, dehiscing longitudinally or by apical pores. Ovary deeply 3–10-lobed, inserted upon a thickened disk enlarging after flowering, each lobe 1-celled, 1-ovulate; style central, filiform or subulate; stigma terminal, simple, or style divided at the apex into as many short branches as carpels; stigmas capitellate. Fruit of 3–10 drupes inserted upon the enlarged torus, sessile. Seeds exalbuminous; radicle very small.—Trees or shrubs. Leaves alternate, simple, perfectly glabrous, penniveined, stipulate. Flowers in terminal or axillary panicles, racemes or fascicles; usually yellow or orange; pedicels articulated.

Ochnaceæ are a small Order, confined to the tropics, most of the genera being peculiar to the New World. The two following genera are shared with both Asia and America.

Stamens indefinite. Anthers dehiscing by pore-like apical slits or longitudinally . . . . . 1. Ochna.
Stamens 10. Anthers dehiscing by apical pores . . . . . 2. Gomphia

1. OCHNA, Schreber; Benth. et Hook. f. Gen. Pl. i. 317.

Sepals 5, coloured, imbricate, persistent. Petals 5–10, equalling or slightly exceeding the sepals, deciduous, narrowed to the base or unguiculate. Stamens indefinite; filaments filiform; anthers linear or oblong, basifixed, dehiscing longitudinally or by pore-like slits. Ovary deeply 3–10-lobed; lobes 1-celled, 1-ovuled, inserted around a central disk. Styles connate, entire or shortly divided at the apex. Stigmas capitellate. Drupes 3–10, sessile.—Trees or shrubs. Leaves alternate, usually serrulate, glabrous, with deciduous stipules. Flowers yellow, rarely greenish, with articulated pedicels.

Principally confined to tropical and subtropical regions of the Old World. All of the African species appear to be confined to the Continent, although one or two have near Indian allies. We have specimens indicating additional species, but not in a condition for description.

Flowers in terminal racemes or corymbs, simple or compound, or terminating short lateral branches.
- Racemes compound. Leaves membranous. Anthers dehiscing by pores . . . . . 1. *O. membranacea.*
- Racemes simple.
  - Anthers dehiscing longitudinally, equalling the filaments. Styles free at apex or connate . . . . . 2. *O. multiflora.*
  - Anthers dehiscing by pore-like slits.
    - Leaves 2–3 in., serratures at length obsolete, cuneate or rounded at base. Racemes lateral, equalling or exceeding the leaves . . . . . 3. *O. pulchra.*
    - Leaves 5–7 in., obovate, narrowed to base. Flowers corymbose. Styles wholly connate . . . . . 4. *O. mossambicensis.*
    - Leaves 2–3 in. Base usually subcordate. Flowers in umbellate corymbs. Styles free at apex . . . . . 5. *O. Kirkii.*

Flowers in axillary fascicles or from very short axillary peduncles, sometimes apparently subterminal.
- Anthers dehiscing longitudinally.
  - Leaves not seen. Flowers yellow. Petals narrowed into a short claw. Fruit-sepals ½–½ in. . . . . 6. *O. leptoclada.*
  - Leaves oval or oblanceolate acute. Flowers "greenish-white," in fascicles of 2–3 . . . . . 7. *O. sp. nov.?*
- Anthers dehiscing by pore-like slits.
  - Leaves oblanceolate-elliptical, broadly acute. Fruit-sepals ½ in. long . . . . . 8. *O. leucophlœos.*
  - Leaves oblanceolate-oval, acute or obtuse. Flowers large; pedicels 1 in. Fruit-sepals ¾–1 in. . . . . 9. *O. macrocalyx.*

Flowers not seen.
- Leaves oblanceolate obtuse; base acute, serrulate. Fruit-sepals ¼–½ in. . . . . 10. *O. Afzelii.*

1. **O. membranacea,** *Oliv.* A glabrous shrub, attaining 6 ft. Leaves rather membranous, oblanceolate-oval or elliptical, narrowed to the acute, occasionally acuminate apex; base narrowed more or less, usually obtuse or narrowly rounded, serrulate; serratures often with a short incurved bristle-tip; midrib and narrow lateral nervures prominent beneath, glabrous; 2½–3½ in. long, ¾–1½ in. broad; petiole usually very short, 1–2 lines, rarely ¼–½ in. Flowers orange, in compound racemes, 1–2½ in. long, terminating lateral

shoots or collected in a paniculate manner towards the extremities of the branches; ½ in. or less in diam. Petals sessile, narrowed to the base. Anthers dehiscing by terminal pores, equalling or exceeding the filaments. Carpels about 5; styles united throughout. Fruit-calyx "flesh-coloured," the sepals ½ in. long or rather less.

Upper Guinea. Sierra Leone and Niger, *Barter!*

2. **O. multiflora,** *DC. Prod.* i. 735. Glabrous shrub. Leaves oblong-elliptical to oblanceolate-oblong, acute or slightly acuminate; base usually more or less obtuse and rounded occasionally broadly, or even subcordate, sometimes cuneate, serrulate or undulate-serrate or serratures obsolete, at length rather coriaceous, 3½–5 in. long, 1¾–2½ in. broad; petioles ⅙–½ in. Flowers in simple, rather short, 10–15-flowered racemes, 2–3 in. long, terminating, short, lateral branches; pedicels articulated near the base, ascending or patent, ½–¾ in. Petals sessile. Anthers equalling the filaments, dehiscing longitudinally. Carpels 6–7. Styles connate throughout, with a subcapitate stigma or minutely divided at the apex. Fruit-sepals spreading or reflexed, about ½ in. long.—DC. Mém. Ochnac. t. 3. *O. dubia,* Guill. et Perr. Fl. Seneg. i. 137. t. 35.

Upper Guinea. Sierra Leone, *Afzelius!* Gambia, *Perrottet!* Nun river, *Mann!*

In the Nun specimens the styles are very shortly free at the apex, but I cannot accept this as a specific difference.

3. **O. pulchra,** *Hook. Ic. Plant.* 588. A shrub of 10 ft. or so. Leaves coriaceous, oblanceolate-oblong, acute or rather obtuse, rounded or cuneate at the base, obscurely veined, with a few minute appressed, probably deciduous spinulose-serrulate teeth above or nearly entire; 2–3 in. long, ¾–1 in. broad; petioles $\frac{1}{10}$–⅛ in. Flowers in simple, lateral racemes as long as or longer than the leaves. Pedicels ⅓–½ in., articulated at the base. Sepals elliptical, obtuse. Anthers rather short, dehiscing by pore-like slits. Carpels (5) 6–7; style divided at the apex. Fruit not seen.

South Central. Lake Ngami, *M'Cabe!* a few racemes only.
Also from Macalisberg.

4. **O. mossambicensis,** *Klotzsch in Peters' Mossamb. Bot.* 88. *t.* 16. Leaves rather large, coriaceous, obovate-oblong, apex broadly rounded with a short broad or obsolete apiculus, narrowed to the more or less acute base, serrulate, veiny above, 5–7 in. long, 2–3 in. broad; petiole 1–2 lines. Flowers in lateral, pedunculate, corymbose racemes. Sepals oblong or ovate, acute. Anthers dehiscing by pores. Carpels 6–8. Styles connate throughout, with a thickened stigma.

Mozamb. Distr. Mozambique, *Peters!*

I have not seen either flower or fruit. The description of the former I have taken from Klotzsch. The species seems distinct enough in its large obovate leaves.

5. **O. Kirkii,** *Oliv.* A glabrous shrub. Leaves coriaceous, obovate-elliptical to oblanceolate-oblong or broadly oblong, obtuse retuse or broadly pointed, base cordate with a narrow sinus, occasionally entire obtuse, spinu-

lose-serrate, venation inconspicuous beneath, 2–3 in. long, 1–1¾ in. broad; petiole rather shorter or slightly exceeding the sinus. Flowers in terminal or lateral pedunculate umbellate corymbs. Pedicels articulated below the middle, ½–¾ in. long. Petals unguiculate, with rotundate lamina. Anthers dehiscing by short slits. Carpels about 9. Styles connate with their apices free. Not seen in fruit.

Mozamb. Distr. Rovuma river, *Dr. Kirk!*

Resembles *O. cordata*, Thw., of Ceylon. It may prove a variety of *O. mossambicensis.*

6. **O. leptoclada,** *Oliv.* A shrub of 3–4 ft., leafless at time of flowering, with pale slender branches, giving off numerous, short, lateral ramuli. Leaves not seen. Flowers rather small, "gamboge-yellow," in 2–4-flowered axillary fascicles; common peduncles very short or obsolete; pedicels filiform, articulated near the base, ½–¾ in. Sepals oblong or elliptical, obtuse. Petals ovate-rotundate, narrowed into the short claw. Anthers considerably shorter than the filament, dehiscing longitudinally throughout their length. Carpels 5 or 4; styles wholly connate. Stigma subcapitate, lobulate. Fruit-sepals ⅓–½ in.

Mozamb. Distr. Manganya Hills, *Dr. Meller!* Marari country, lat. 12° S., long. 34° E., *Dr. Kirk!*

7. **O. sp. nov.?** A glabrous shrub "of 6 ft.," leafless at time of flowering. Young leaves apparently oblanceolate-oval, acute, narrowed to the base. Pedicels 2 3 together, from very short or obsolete axillary peduncles, filiform, ½ in. long or little more, articulated at or near the base. Flowers small, "greenish-white." Sepals ovate to oblong, Anthers rather shorter than the filaments, dehiscing longitudinally. Ovary 6–7-lobed. Styles united throughout with a subcapitate stigma. Fruit not seen.

Upper Guinea. Niger, *Barter!*

Perhaps a form of *O. leptoclada.*

8. **O. leucophlœos,** *Hochst.; Rich. Fl. Abyss.* i. 129. *t.* 29. A tortuous shrub. Leaves rather coriaceous, oblanceolate-elliptical oval or oblong-elliptical, broadly acute, somewhat cuneate at base, rather closely serrulate, 3 6 in. long; petioles 2–3 lines. Flowers usually several together, 3–10 from the axils of the leaves of the previous year; the common peduncle very short or obsolete; pedicels ¾–1 in., articulated below the middle. Sepals obtuse. Petals unguiculate. Anthers dehiscing by pore-like subapical slits. Carpels 5 6. Styles free at the apex. Stigmas capitellate. Fruit-sepals about ½ in. long.

Nile Land. Abyssinia, *Schimper!* Sennar, *Cienkowski.*

I have had but imperfect material for description.

O. ardisioides, *Webb, Frag. Fl. Æthiop.* 59, of which I have not seen an authentic specimen, is nearly allied to the above, if indeed specifically distinct. The more important characters in which it differs from *O. leucophlœos*, Mr. Webb states to be the narrower petals, which are twice as long as the sepals, fewer stamens, and longer style, which is 4–5-fid, and not 5–6-fid as is usual in *O. leucophlœos.* The specimens described by Webb were probably from Sennar. Dr. Schweinfurth collected what he regards as the same plant near

Matamma. Of this I have seen only a specimen in leaf, which may well belong to Hochstetter's species.

9. **O. macrocalyx,** *Oliv.* A low glabrous shrub of ½–2 ft., from a thick woody stock. Leaves narrowly oblanceolate-oval, acute or subacute, base rather obtuse, serrulate, reticulation rather prominent on both surfaces, 3–4 in. long, ¾–1 in. broad; petiole 1 line or obsolete. Flowers in very short, axillary, 3–7-flowered racemes, sometimes collected near the end of the branches; common peduncle ¼–½ in. or obsolete; pedicels articulated a little above the base, 1 in. long. Sepals obtuse. Petals rotundate, unguiculate. Anthers dehiscing by subapical pores, equalling or exceeding the filaments. Carpels 5. Styles connate very nearly to the apex; stigmas capitellate. Fruit sepals erect, ¾–1 in. long.

Mozamb. Distr. Sotshi, *Dr. Kirk!* Manganya mountains, 1–3000 ft., *Dr. Meller! Waller!* E. tropical Africa, lat. 6° 56′ S., 1700 ft., *Speke and Grant!*

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10. **O. Afzelii,** *R. Br. mss. in Herb. Mus. Brit.* Wholly glabrous. Extremities minutely lenticellate. Leaves oblanceolate, rather obtuse or obtusely apiculate, narrowed to the base from above the middle, distinctly serrulate, finely reticulate especially above, 2½–3½ in. long, ¾–1¼ in. broad; petioles 1–2 lines. Flowers in lateral, few-flowered, subsessile fascicles or on peduncles of 1–2 lines. Pedicels ½ in. more or less. Fruit-sepals reflexed, about ¼ in. long. Petals shortly clawed. Stamens . . ?

Upper Guinea. Sierra Leone, *Afzelius!*

This may prove identical with one of the above. I have not had sufficient material for examination. Nearly allied to it and chiefly differing in having somewhat glaucous leaves are fruiting specimens in the Kew herbarium from the Niger (*Barter!*).

2. GOMPHIA, Schreb.; Benth. et Hook. f. Gen. Pl. i. 318.

Differs from *Ochna* in having only 10 stamens. The anthers are elongate often rather abruptly produced, rugulose, and opening by terminal extrorse pores. Lobes of the ovary usually 5. Style simple.—Trees or shrubs, perfectly glabrous. Leaves as in *Ochna*, in a few species with closely parallel veins; stipules intra-axillary more or less connate, or lateral. Racemes or panicles terminal or axillary, or the flowers rarely in axillary fascicles.

A large genus, by far most numerous in tropical S. America. The following species appear to be endemic. It is very difficult to determine their probable limits, and the following synopsis of our specimens can only be regarded as tentative.

Venation closely parallel from the midrib to the margin.
- Leaves thinly coriaceous, oval or elliptic-oblong, usually with a narrow acumen; 2–4 in. Flowers in short, often loosely panicled racemes. Fruit-sepals ½ in. . . . . 1. *G. affinis.*
- Leaves coriaceous, 4–7 in., broadly oblanceolate. Flowers in lateral racemes of 2–4 in. Fruit-sepals ½ in. . . . . 2. *G. calophylla.*

Principal lateral veins curving forward, more or less distant, with intermediate veinlets.
- Flowers in terminal paniculate simple or compound racemes.
  - Leaves 3–6 in., oblanceolate or oblong-oval, acute or acuminate. Fruit-sepals patent or reflexed, 3–4 lines. Stipules intra-axillary, triangular, 2-fid . . . . . 3. *G. reticulata*

Leaves 6–10 in. Fruit-sepals usually ascending, $\frac{1}{3}$–$\frac{1}{2}$ in. . . . 4. *G. Vogelii.*
Flowers in lateral or apparently terminal, rarely paniculate racemes, occasionally sparingly branched near the base.
Leaves elongate, subsessile, truncate at base, submembranous. Racemes on peduncles of 1–2 ft. Fruit-sepals $\frac{1}{3}$ in. . . . 5. *G. elongata.*
Leaves elongate, subsessile, subcordate at base, coriaceous. Racemes 2–10 in. Fruit-sepals $\frac{1}{2}$ in. . . . . 6. *G. Mannii.*
Leaves narrowed or but slightly rounded at the base.
Racemes terminal with peduncle of 3–10 in. Flowers crowded. Pedicels $\frac{1}{4}$ in. Stipules triangular . . . . . 7. *G. congesta.*
Racemes terminal simple or sparingly branched below. Pedicels $\frac{1}{2}$ in., not crowded. Stipules subulate . . . . . 8. *G. glaberrima.*
Flowers in axillary fascicles. Leaves oblanceolate, spinulose-serrate. Petals linear . . . . . 9. *G. axillaris.*

1. **G. affinis,** *Hook. f. Fl. Nigrit.* 274. Shrub of 10–15 ft. Leaves thinly coriaceous, shining, oval to oblong-elliptical, acute, usually with a narrow linear acumen, cuneate or slightly rounded at the base; margin undulate-crisped, nearly entire or serrulate; lateral veins all nearly similar, closely parallel; 2½–4 in. long, 1–1½ in. broad; petiole $\frac{1}{12}$–$\frac{1}{4}$ in. Stipules triangular-subulate, distinct or nearly so. Flowers in short racemes from the axil of reduced leaves or squamiform bracts, usually collected towards the ends of the branches, forming small loose panicles shorter than or equalling the leaves, occurring also in lateral few-flowered fascicles or subsolitary; pedicels ¼–¾ in., slightly thickened above, in fruit. Sepals lanceolate- or linear-oblong, obtuse, about ¼ in. Petals oval or elliptical, narrowed at the base. Anthers sessile, elongate-linear. Drupes ellipsoidal or obovoid, slightly exceeding the sepals.

Upper Guinea. Fernando Po, *T. Vogel! Mann!* Brass and Idda, *Barter!* Cape Coast, *Brass!*

2. **G. calophylla,** *Hook. f. Fl. Nigrit.* 274. Leaves coriaceous, oblanceolate- or obovate-oblong, shortly and usually more or less abruptly acuminate or apiculate, narrowed to the base, crisped-undulate; lateral veins obscure, all similar and closely parallel; 4–6 in. long, 1½–2½ in. broad; petiole $\frac{1}{6}$–½ in. Stipules acute, distinct. Flowers in lateral racemes of 2–4 in., from the axils of reduced or squamiform leaves, several- or many-flowered; pedicels ¼–½ in., singly inserted, or sometimes fasciculate from very short or obsolete peduncles. Sepals oval-oblong, obtuse, about ½ in. long, variously spreading in fruit. Flowers not seen.

Upper Guinea. Sierra Leone, *Don! T. Vogel!*

A fragment of an *Ochna* is mounted upon one of the sheets with the above, and it is probably to it that the Fernando Po label applies, quoted in Niger Flora, l. c.

3. **G. reticulata,** *P. de Beauv. Fl. d'Owar.* ii. 22. *t.* 72. A glabrous shrub or small tree. Leaves usually more or less coriaceous, oval-oblong or oblanceolate-oblong, occasionally elongate, acute or acuminate, base cuneate or slightly rounded, acutely serrulate crenulate-serrate or rather distantly or undulate-serrulate, serratures in some forms obsolete, principal secondary lateral veins more or less distant, curving forwards, not prominent; 3–6 in. long, 1–2 in. broad; petiole ¼ in. or the lamina narrowed nearly to

the base. Stipules 2-fid or at length free. Flowers yellow to orange-red, in terminal panicled simple or compound racemes, exceeding or equalling the upper leaves; pedicels usually fascicled at short intervals along the rachis from short common lateral peduncles, more rarely inserted singly, articulated at or near to the base, ¼–½ in. long. Sepals at length 3–4 lines, linear-oblong to lanceolate or ovate-oblong, obtuse in fruit, patent or reflexed, usually nerved. Petals obovate, narrowed more or less to the base. Anthers sessile or subsessile, elongate. Drupes 2–3 (rarely 5) lines long, ellipsoidal or subglobose.—*G. flava*, Schum. et Thonn. Guin. Pl. 216 (ex descr.). *G. macrophylla*, Hook. f. in Lond. Journ. Bot. vi. 2. *G. Turneræ*, Hook. f. Fl. Nigrit. 273 (a finely acuminate nearly entire-leaved form).

Upper Guinea. Sierra Leone! *various collectors.* Fernando Po, *T. Vogel!* Gambia. Old Calabar, *W. C. Thomson!*

Var. β. (*G. Schœnleiniana*, Klotzsch in Schœnl. Nachl. (Extr.) 238. t. 4) differs in having the leaves narrowed to an emarginate base. I have not seen specimens. Cape Palmas, *Schœnlein.*

Var. γ. (*G. micrantha*, Hook. f. in Journ. Linn. Soc. vi. 8). Flowers very small, red. Clarence Peak, Fernando Po, 5000 ft., *Mann!*

4. **G. Vogelii,** *Hook. f. Fl. Nigrit.* 272. Characters of above, differing in the rather larger coriaceous leaves, 6–10 in. long, and the ascending and rather broader fruit-sepals from ⅓–½ in. Flowers not seen.

Upper Guinea. Grand Bassa, *T. Vogel!* Brass, *Barter!*

5. **G. elongata,** *Oliv.* A shrub "of 10–12 ft." Leaves submembranous, subsessile or very shortly petiolate, elongate, narrowly oblanceolate-oblong, acute or acuminate, base abruptly contracted, truncate or scarcely subcordate, denticulate-serrate, midrib and principal lateral veins prominent below; 8–16 in. long, 2–3 in. broad. Stipules connate, 2-fid, intra-axillary. Flowers in elongate interrupted racemes from the axils of ordinary or reduced squamiform leaves, on long peduncles with the raceme 1–2 ft. long, resembling those of *G. dependens*, occasionally giving off 1 or 2 short lateral branches below; pedicels solitary or in fascicles of 2–6, ¼–⅓ in. long. Sepals lanceolate-oblong, subacute. Petals oblanceolate, rather longer than the sepals. Anthers sessile. Fruit-sepals ⅓ in. or less than ½ in., shorter than the subglobose or obovoid raised drupes which are slightly keeled when dry.

Upper Guinea. Fernando Po, *Mann!*

This may prove to be a form, modified perhaps by shade, of *G. macrophylla.*

6. **G. Mannii,** *Oliv.* Shrub from 3 or 4 to 10 ft. Leaves large, subsessile, more or less coriaceous, elongate-oblanceolate-oblong, acute or shortly acuminate, narrowed to the rather broad subcordate base, denticulate-serrate, midrib and principal lateral veins prominent below; 9 in. to 2 ft. long, 2–4½ in. broad. Stipules apparently distinct. Flowers in lateral or subterminal crowded racemes, together with the peduncles 6 10 in. long. Pedicels interruptedly and usually densely fascicled, ¼ ⅓ in. long; base of pedicels below the articulation persistent. Sepals oblong-lanceolate, rather obtuse. Petals obovate- or oblanceolate-oblong. Filaments very short or anthers subsessile, produced above into a narrow linear extremity, dehiscing

by extrorse pores. Fruit-sepals about ½ in. long, coriaceous, erect, incurved over the drupes.

Upper Guinea. Fernando Po, *Mann!*

Var. *brachypoda.* Leaves 5–12 in. Flowers crowded in racemes of 2–3 in., singly bracteolate or less distinctly fascicled than in the above. Sepals apparently rather smaller in fruit.

Old Calabar, *W. C. Thomson!*

7. **G. congesta,** *Oliv.* Shrub. Leaves oblanceolate-oval or -oblong or oblong-elliptical, sometimes elongate, acute or acuminate, narrowed more or less at the cuneate or slightly rounded base, serrulate, midrib prominent beneath; 3–10 in. long, 1½–3 in. broad; petiole 1–3 lines. Stipules triangular, 2-fid or 2-partite. Flowers more or less crowded in terminal, pedunculate, simple racemes, together with the peduncle from 3½–10 in. in our specimens. Pedicels equalling the flowers, about ¼ in., usually in several-flowered fascicles from obsolete lateral peduncles. Sepals ovate or ovate-oblong, obtuse. Petals obcordate-cuneate. Filaments considerably shorter than the anthers. Fruit-sepals equalling the drupes, bright red.

Upper Guinea. Sierra Leone. Ambas Bay, *Mann!*

In the Sierra Leone specimen the stipules are connate below, in the Ambas Bay examples nearly free. This may indicate specific difference. The Ambas Bay plant much resembles *G. dependens*, a Madagascar species, figured by De Candolle in his Mém. Ochn. t. 6, but the latter has remarkably large stipules.

8. **G. glaberrima,** *P. de Beauv. Fl. d'Oware*, ii. 22. *t.* 71. Leaves oblanceolate, acutely acuminate, serrulate, narrowed to the base, 3–4 in. long, 1¼–1½ in. broad. Stipules narrow-subulate, distinct, lateral. Flowers in a terminal raceme, simple or sparingly branched below. Pedicels patent, ½ in. long. Sepals about ¼ in., broadly oblong, obtuse, erect, enclosing the young fruit. Filaments persistent, equalling the raised disk.

Upper Guinea. Oware, *Beauvois;* Old Calabar, *W. C. Thomson!* Lagos Island, *Barter!*

9. **G. axillaris,** *Oliv.* A shrub of "12 ft." Leaves rather coriaceous, broadly oblanceolate or oval, acutely often rather abruptly acuminate, much narrowed or cuneate at the base, rather distantly repand-spinulose-serrate, teeth probably deciduous, acumen entire; 4–6 in. long, 1¼–2½ in. broad; petiole ⅛–¼ in. Stipules apparently connate, deciduous. Flowers in lateral fascicles of 2 or 3; common peduncle obsolete; pedicels ⅓–¾ in. Petals very narrow, linear-oblong, exceeding the sepals. Filaments much shorter than the elongate narrow-linear, but not abruptly narrowed, anthers. Fruit not seen.

Upper Guinea. River Kongui, *Mann!* Sierra Leone, *Morson!*

Order XXXVI. BURSERACEÆ (by Prof. Oliver).

Flowers hermaphrodite or polygamo-diœcious. Calyx 3–4 5-lobed or -partite; segments valvate or imbricate. Petals 3–5, valvate or imbricate.

Stamens as many or twice as many as petals, inserted on the margin or on the outside of a fleshy disk. Filaments naked, subulate or filiform. Anthers 2-celled. Ovary free, 2–5-celled, ovoid or globose; stigma subsessile or style short, thick. Ovules geminate (solitary in *Hemprichia ?*). Fruit drupaceous or capsular. Seeds exalbuminous. Cotyledons usually thin and more or less contorted; radicle superior.—Trees or shrubs, often resiniferous. Leaves alternate, exstipulate, 3-foliolate or imparipinnate, rarely unifoliolate. Flowers small, paniculate, racemose or fascicled.

A considerable tropical Family. But one satisfactorily ascertained genus is peculiar to Africa.

Ovules geminate.
- Leaves imparipinnate. Stamens 10. Ovary 3-celled. Pericarp 3-valved . . . . . 1. BOSWELLIA.
- Leaves 3–1-foliolate or imparipinnate. Stamens 8, 4 shorter. Ovary 2–3-celled. Fruit drupaceous . . . . . 2. BALSAMODENDRON. (*See Protium ?* p. 329.)
- Leaves imparipinnate. Stamens 6. Ovary 2-celled. Drupe 1-seeded . . . . . 3. CANARIUM.
- Leaves digitate, 5-foliolate. Flowers unisexual . . . . . 4. PAIVÆUSA.

Ovules solitary. Leaves 3–5-foliolate. Stamens 8. Outer layer of pericarp at length separating in 2–4 valves. Inner layer dimidiate, arillus-like . . . . . (*See Hemprichia*, p. 328.)

1. BOSWELLIA, Roxb.; Benth. et Hook. f. Gen. Pl. i. 322.

Flowers regular, hermaphrodite. Calyx 5-toothed. Petals 5, spreading, imbricate. Stamens 10, inserted outside a fleshy free undulate disk. Ovary 3-celled, narrowed into the style; stigma terminal obtuse subentire or 3-lobed. Ovules geminate. Capsule trigonous, coriaceous, the epicarp separating in 3 valves from as many bony 1-seeded nuts. Embryo with "contorted multifid cotyledons and a superior radicle."—Trees or shrubs, abounding in resin; bark deciduous in papery or membranous laminæ. Leaves usually crowded towards the ends of the branches, alternate, imparipinnate, exstipulate. Panicles or racemes axillary, or collected at the ends of the branches, precocious.

A small genus of N. tropical Africa and India, including several species affording resins of commercial value, but which our material does not suffice to identify and describe. It is most desirable that specimens should be obtained in leaf, flower, and fruit, with samples of the resin afforded by the respective species. I have described below the leafy specimens of several resin-producing species of the Somali country transmitted to the late Sir W. J. Hooker by Col. Playfair.

1. **B. papyrifera,** *Rich. Fl. Abyss.* i. 148. *t.* 33. A tree abounding in a fragrant resin; bark separating in papery laminæ. Leaves 1 ft. more or less, multifoliolate, more or less tufted at the extremities of the branches, shortly and softly pubescent; lateral leaflets usually subopposite, oblong-lanceolate, from an oblique rounded or subtruncate base, rather obtusely pointed, unequally crenate, subsessile, or petiolules very short; 2½–3½ in. long, 1–1½ in. broad. Flowering extremities as thick or thicker than the finger, terminating rather abruptly. Flowers precocious, in spreading, distichously-branched, pubescent-tomentose panicles, 6 in. long more or less, collected at

the ends of the branches. Pedicels equalling the calyx or usually shorter than the flowers, which are about ½ in. across when expanded. Calyx-lobes 5, deltoid. Disk free, undulate, persistent. Ovary glabrous, narrowed into the rather thick style. Stigma obtuse, scarcely capitate. Capsule 1 in. long, clavate-trigonous, shortly narrowed above to an obtuse extremity tipped by the remains of the style, narrowed to about twice the length below. Seeds each enclosed in a separate bony endocarp acutely and abruptly pointed below.—*Amyris papyrifera*, Delile, Voy. à Méroë, 99. *Plösslea floribunda*, Endl. Iconog. 56. t. 28.

Nile Land. Abyssinia, *Schimper!* Sennar, *Kotschy! Cienkowski.*
Forming entire forests in the country of Bertât (*Delile*).

Probably distinct species of *Boswellia*, of which the flowers and fruit are unknown.

1. Niger, *Barter*. Leaves multifoliolate, 1–1½ ft. Leaflets alternate, coriaceous, oblong-lanceolate, obtuse, obliquely rounded or the upper margin truncate at the base, broadly toothed, the largest about 6 in. by 2 in., soft to the touch with minute pubescence or at length glabrous above, pale and glaucous beneath; midrib and lateral veins darker, rather prominent.

2. Madi, White Nile, *Speke and Grant*. Leaves multifoliolate, glabrous, 1–1½ ft. Leaflets alternate coriaceous oblong-lanceolate obtuse or rather acute, rounded and very unequal at the base, rather wavy or distantly and broadly toothed, the largest (about one-third from the end) 5 in. by 1¾ in.; lower leaflets considerably smaller, shining and reticulated above, glaucous with prominent midrib and reticulation beneath; petiolules very short.

3. Somali Country, *Col. Playfair*, 'Yegaar,' affording the resin *Luban Maitee*. Extremities terete, ⅛–¼ in. diam., with deciduous papery epiderm. Leaves 2–4½ in. long, 7–9–11-foliolate, in terminal and lateral tufts, coriaceous, glabrous, and very glaucous above and below with obscure reticulation; leaflets opposite or subopposite, ovate-oblong or -rotundate; apex very obtuse or rounded, lateral leaflets cordate or subcordate, very wavy, sessile, ¾–1 in. long. Stated to grow near the coast, out of smooth limestone rock.

4. Bunder Murayah, Somali Country, *Col. Playfair*. 'Mohr Add' (White). Bark separating in membranous flakes. Leaves in terminal tufts, ½–1 ft. or rather more in length, multi-(11–17)foliolate, coriaceous glabrous or on expansion obsoletely puberulous, white and glaucous beneath; leaflets mostly opposite or subopposite, oblong-lanceolate, more or less obtuse, base cordate or subcordate, entire or sinuous, reticulated beneath, the network usually relieved by the glaucous interstices, 1–2½ in. by ⅜–¾ in. Found further inland than the 'Yegaar,' about the summits of hills.

5. Somali Country, *Col. Playfair*. 'Mohr Madow' (Black) with the preceding yielding the *Luban Bedowi*, the *Olibanum* of commerce. Leaves 8–12 in., 15–17-foliolate, pubescent or glabrescent above. Leaflets coriaceous, sessile, elliptic- or ovate-oblong, very obtuse, cordate or subcordate at the base, irregularly sinuous or entire, rather soft to the touch above with a short or obsolete pubescence, beneath paler, minutely pubescent-tomentose, midrib and lateral veins rather prominent, 1½–2 in. by ¾–1 in., or terminal leaflet larger. Also inland, usually in the valleys and lower parts of the hills.

6. Somali Country, *Col. Playfair*. Also labelled (through mistake?) 'Mohr Madow' (perhaps *Boswellia papyrifera*). Leaves 6–10 in., multifoliolate, pubescent. Leaflets subopposite or alternate, coriaceous, sessile, oblong or oblong-lanceolate, obtuse; base more or less cordate, crenate or crisped, shortly pubescent, rugose beneath with prominent venation, 1–1½ in. by ½–1 in.

2. BALSAMODENDRON, Kth.; Benth. et Hook. f. Gen. Pl. i. 323.

Flowers polygamous. Calyx campanulate or shortly tubular, 4-toothed, persistent. Petals 4, erect or with recurved tips, linear- or oblanceolate-

oblong, valvate or with the sides slightly imbricate and tips incurved in æstivation. Stamens 8, inserted on or outside the margin of a cupuliform disk, alternately shorter. Ovary 2–3-celled, narrowed into a short thick style; stigma obtuse, undivided, or margins lobulate. Ovules geminate, collateral, pendulous. Fruit an ovoid or subglobose drupe with 1–3 bony, 1-seeded pyrenes. Seeds exalbuminous. Cotyledons contortuplicate, sheathing the terete pointed radicle.—Shrubs or small trees, often spinose, resin-affording Leaves alternate, 1–3-foliolate or imparipinnate. Flowers small, fascicled on thickened nodes or short lateral ramuli, or on 1–4-flowered, axillary jointed peduncles.

A small genus of Africa and the desert tracts of Arabia and India. The species much want careful revision, but this cannot be satisfactorily attempted without more ample material than we at present possess.

Calyx campanulate or tubular.

Leaflets usually 3–1, crenate-serrate. Peduncles very short . .	1. *B. africanum.*
Leaflets 3–5, entire or obscurely undulate. Peduncles short . .	2. *B. Opobalsamum.*
Leaflets 5–11, serrate-dentate. Flower-fascicles distinctly pedunculate	3. *B. pedunculatum.*

Calyx divided nearly to the base.

Leaves usually 3-foliolate; leaflets obovate, glabrous	4. *B. Playfairii.*
Leaves 5–7-foliolate; leaflets entire, pubescent	5. *B. molle.*

1. **B. africanum,** *Arn. in Ann. Nat. Hist.* iii. (1839) 87. A shrub or small tree, usually more or less spinose; extremities minutely pubescent or glabrous: in desert situations with numerous lateral, subpatent, spinous ramuli. Leaves usually 3-foliolate; leaflets rather coriaceous, median larger, obovate, with a cuneate or gradually narrowed base, obtuse or broadly pointed, broadly crenate-serrate, usually pubescent at least beneath or on expansion, ½–1½ in. long, ½–1 in. broad; lateral leaflets oblique, often less than half as large as the median. Petioles equalling or much shorter than the leaflets. Flowers fasciculate. Calyx campanulate or shortly tubular. Anthers of the shorter stamens apiculate. Drupe subglobose, slightly oblique, with a 1-celled putamen by abortion in the specimens which I have seen.—*Heudelotia africana*, Rich. in Fl. Seneg. i. 150. t. 39. *B. Schimperi* and *B. Kotschyi*, Berg in Bot. Zeit. 1862, 162.

Upper Guinea. Senegambia! Kworra, *Barter!*
Nile Land. Abyssinia, *Schimper!*
Mozamb. Distr. Rovuma river, *Dr. Kirk!*

Var. *abyssinicum.* Leaves 3-1-foliolate, glabrous, acute or subacute, not deeply crenate.—*B. abyssinicum*, Berg in Bot. Zeit. 1862, 161. *B. Kafal*, Kth.? of Herb. Schimp. n. 1359. *B. Kafal*, Rich. Fl. Abyss. i. 149.

Nile Land. Abyssinia, *Schimper!* Ugani, *Speke and Grant!*
Mozamb. Distr., *Dr. Kirk!*

Var. *ramosissimus.* With numerous short spreading spinous lateral ramuli. Petioles very short; leaflets at length somewhat glassy.

North Central. Kouka, *E. Vogel!*

Richard's figure in 'Fl. Senegambia' represents all the anthers as apiculate, and Berg makes use of this character in distinguishing the Abyssinian plant specifically, but in both the Senegambian and Abyssinian plant, I find only the shorter stamens with apiculate anthers. In the Kew herbarium there are specimens of a Lycioid-looking *Balsamodendron*, with precocious flowers on bracteolate pedicels, but without leaves, which a note by Dr. Kirk

describes as "simple." The numerous lateral spinose ramuli spread nearly at right angles. The pedicellate flowers are fasciculate subsessile or on short 2–3-flowered peduncles Calyx deeply campanulate. Drupes obliquely ellipsoidal, apiculate. I think they also belong to *B. africanum*. They are from Koobie to N. Shaw Valley, *Baines!* Lake Ngami, *Chapman!* and Batoka Country, *Dr. Kirk!*

2. **B. Opobalsamum,** *Kth. in Ann. Sc. Nat.* ii. (1824) 348. Tree or shrub, wholly glabrous or the extremities and leaves occasionally finely pubescent, unarmed. Leaves scattered or in fascicles of 2, 3, or more, from short or suppressed lateral branchlets often under 1 in. in length, 3–5-foliolate, very rarely 1-foliolate with a distinct common petiole; leaflets obovate or oblanceolate, obtuse or broadly acute, entire or obscurely undulate. Calyx campanulate, shortly 4-toothed. Fruit ovoid or ellipsoidal, smooth, glabrous, apiculate.—*B. gileadense*, Kth.; Berg in Bot. Zeit. 1862, 163. *B. Ehrenbergianum*, Berg, l. c.

Nile Land, Nubia, *Schweinfurth!*

Arabia and perhaps also in Beloochistan.

I have had but insufficient material for examination.

3. **B. pedunculatum,** *Kotschy et Peyr. in Pl. Tinn.* 11. *t.* 5. B. Small tree with erect terete striate branches, pubescent the first year, at length glabrous. Leaves more or less fascicled at the extremities, 1½–4 in. long, 5–11-foliolate; leaflets sessile, oval or oblong, acute, serrate-dentate, pubescent or shortly pilose on both sides, ½–1 in. long. Flowers clustered, subsessile or shortly pedicellate, in pedunculate, axillary, few-flowered cymes. Calyx urceolate-campanulate, 4-toothed, teeth triangular. Petals oblong-spathulate, pubescent externally. Stamens alternately shorter; anthers muticous or obscurely mucronulate. Fruit not described.

Nile Land. On the Bahr Ghasal, a tributary of the Upper Nile, *Heuglin*; Sennar, *Cienkowski*; Kordofan, *Kotschy*.

I have not seen a specimen.

4. **B. Playfairii,** *Hook. f. in Herb. Kew.* Glabrous, spinose; spines slender, rigid, very acute, ¼–½ in. long or terminating lateral leafy ramuli. Leaves fasciculate, 3-foliolate, coriaceous, glabrous; median leaflet obovate to oblanceolate, broadly pointed or shortly and abruptly apiculate, narrowed below, entire or obsoletely and remotely crenulate-serrate, about ½ in. long, ¼ ⅓ in. broad; lateral leaflets much smaller. Petiole not exceeding 1 line, or leaves subsessile. Calyx very short, 4-partite, lobes ovate-deltoid, persistent. Anthers muticous. Petals not seen. Drupes subsessile, ¼ in. long, ellipsoidal, rather acute when dry.

Nile Land. Somali Coast, *Col. Playfair!*

Said to afford the Hotai resin. This shrub belongs to the genus *Balsamophloeos* of Berg (Bot. Zeitung, 1862, 163), which, however, can hardly be maintained as distinct from *Balsamodendron*. This plant must be very nearly allied to, if not identical with, *B. Kataf*, Kth. (*Balsamophloeos*, Berg. l. c.), which Drs. Schweinfurth and Ascherson report from Abyssinia and Nubia. I have not, however, had specimens for comparison.

5. **B. molle,** *Oliv.* Shrub or small tree with pubescent annual shoots, unarmed or spinescent. Leaves usually fascicled at the ends of the lateral

branchlets, imparipinnate, 5–7-foliolate, more rarely 3-foliolate, 2–3 in. long, pubescent above, shortly tomentose beneath; lateral leaflets sessile or subsessile, elliptical or oblong-elliptical, rather acute, rounded or slightly cordate at base, entire, ¾–1¼ in. long, ⅓–½ in. broad; terminal leaflet scarcely larger than those of uppermost pair. Flowers 1–4, on short peduncles; pedicels ⅛–¼ in., pubescent. Calyx divided nearly to the base into 4 lanceolate-triangular, subacute teeth. Petals lanceolate, narrowed above and below, recurved at the tip. Four shorter stamens with apiculate anthers. Fruit ovoid or subglobose, obtuse or subapiculate, pubescent.

Mozamb. Distr. Zambesi, *Dr. Kirk!*

3. CANARIUM, Linn.; Benth. et Hook. f. Gen. Pl. i. 324.

Flowers hermaphrodite or polygamous. Calyx urceolate or cupulate, 3-toothed or 3-fid; lobes valvate, persistent. Petals 3, exceeding the calyx, valvate or slightly imbricate. Stamens 6 (in African species), inserted on the margin or outer side of a fleshy entire or undulate disk; filaments distinct. Ovary ovoid, 2-celled (in African species); ovules geminate; stigma sessile or subsessile, capitate. Drupe ovoid or ellipsoidal, with a bony 1-seeded putamen. Cotyledons contortuplicate.—Trees. Leaves alternate, imparipinnate, exstipulate, the lowest pair of leaflets occasionally resembling stipules. Flowers small, in axillary panicles.

A considerable genus, most numerous in India and the Malayan region. The African species appear to be confined to the continent, and differ from their allies in the more deeply divided calyx and other characters which, however, do not warrant their generic separation.

Leaflets 15–17, acuminate, 1½–2 in. broad; petiolule 1–2 lines . . 1. *C. edule.*
Leaflets 7, apiculate, 3½–5 in. broad; petiolule ½–1 in. . . . . 2. *C. macrophyllum.*

1. **C. edule,** *Hook. f. Fl. Nigrit.* 285. Tree. Leaves imparipinnate, 15–17-foliolate; leaflets rather coriaceous, subopposite or more or less approximated in pairs, from ovate- to oval-oblong, usually narrowly and often somewhat abruptly acuminate, base oblique, glabrous above and at length beneath, excepting on the midrib which remains pubescent or shortly hispidulous; lateral veins and reticulation rather prominent beneath; upper leaflets 4–6 in. long, 1½–2 in. broad; lower smaller and lowest pair rotundate, apiculate, 1 in. in diam. or less. Petiolules 1–2 lines. Inflorescence in narrow, axillary, shortly rusty-tomentose panicles, usually collected near the ends of the branches, ½–1 ft. long, with short (¼–2 in.) lateral peduncles bearing several rather crowded or irregularly clustered flowers, subsessile or on pedicels equalling the calyx. Flowers from 1½–3 lines in length. Calyx 3-partite; lobes broadly ovate, rather obtuse. Stamens 6. Ovary glabrous, 2-celled; stigma sessile or subsessile. ("Fruit oval, black, size of a hen's egg, 1-celled, containing a large embryo, having 2 3-parted cotyledons," *Don.*)—*Pachylobus edulis,* Don, Gen. Syst. ii. 89.

Upper Guinea, St. Thomas's, *Don!* Old Calabar, *W. C. Thomson!* Camaroons river (cultivated), *Mann!* I have not seen the fruit.

2. **C. macrophyllum,** *Oliv.* A tree of 30 ft.; extremities, when dry,

striate, puberulous. Leaves imparipinnate, apparently about 7-foliolate; leaflets opposite, firmly membranous, petiolulate, oblong- or broadly-elliptical, entire, apiculate, glabrous above, minutely scaberulous beneath, 5–6 in. long, 3–3½ in. broad or terminal leaflet 8 in. by 5 in.; petiolules ½–1 in. Flowers small, in axillary, erect or ascending panicles of 4–6 in., usually 2 or 3 together: lateral branches, at least the upper ones, short or flowers fascicled. Pedicels equalling the 3-partite calyx or shorter. Calyx-lobes broadly ovate-deltoid. Stamens 6, inserted on the outer side of an undulate disk. Ovary glabrous, 2-celled. Ovules geminate.

Upper Guinea. Small Kobi Island, Gulf of Guinea, *Mann!*

The fruit, which I have not seen, Mr. Mann says is eaten by the natives.

4. **PAIVÆUSA,** Welw.; Benth. et Hook. f. Gen. Pl. i. 993.

Flowers unisexual; male in shortly pedunculate involucrate capitula; female solitary. Male fl.: Calyx more or less oblique, deeply 6–8-fid; lobes unequal, erect, obtuse. Petals 0. Stamens 6–8, inserted around a crenate disk; filaments filiform, glabrous. Anthers basifixed, 2-celled, dehiscing longitudinally. Ovary obsolete. Female fl.: Calyx same as in male, but larger, persistent. Petals 0. Ovary ovoid, surrounded by 6–7 minute, ciliate, distinct or confluent scales, 2-celled; style short; stigmas 2, reniform; ovules geminate, pendulous from near the apex of the cells. Fruit obovoid; epicarp coriaceous; endocarp thin, imperfectly 2-valved, with 1–2 bony pyrenes in each cell. Seed exalbuminous; cotyledons broadly obcordate, plane; radicle superior, short, straight.—Small tree, with stout tuberculate branches. Leaves alternate, fascicled at the extremities, digitate; leaflets 5 (rarely more or fewer), oblanceolate or obovate-oblong, rather obtuse, entire, tomentose beneath. Flowers inconspicuous; the male in densely fascicled involucrate heads.

But one species is known.

1. **P. dactylophylla,** *Welw. in Linn. Trans.* xxvii. (*ined.*) *t.* 7. A small tree of 8–15 ft.; extremities brownish- or rusty-tomentose or silky. Leaves spreading, thinly pubescent above, at length nearly glabrous, softly tomentose beneath; leaflets 2½–5 in. long, 1–1¾ in. broad; petiole 2–3 in. Male flowers 30 or more in each head; involucre unequally 6–8-lobed.

Lower Guinea. Huilla, Angola, *Dr. Welwitsch!*

For the details of the above description I am indebted to Dr. Welwitsch!

? Hemprichia, Ehrenb.; Benth. et Hook. f. l. c. 327. "Flowers hermaphrodite. Calyx 4-fid. Petals 4, hairy externally. Stamens 8, inserted on the margin of an adnate disk. Ovary ovoid, 2-celled, with a short thick style and 3-sulcate stigma; ovules solitary. Fruit globose; the outer layer of the pericarp separating in 2–4 deciduous valves; inner layer sheathing the base of the 1-celled (by abortion) pyrene, red, succulent, resembling an arillus. Seed exalbuminous; cotyledons plicate; radicle superior.—A shrub or tree. Leaves alternate, 3–5-foliolate. Panicles short, axillary."

Based upon a plant (*H. erythræa*, Ehrenb.) collected on the Island Ketumbul, in the Red Sea.

Specimens under this name are distributed by Dr. Schweinfurth, collected on the coast of Nubia. The leaves are clustered at the extremities of the branches or scattered on barren shoots, all 3-foliolate, more or less shortly or subscabrid-pubescent; leaflets obovate or the smaller lateral ones obliquely ovate, usually obtuse, crenate-serrulate; the medium 1½–2 in. long, narrowed to the petiolule. Calyx 4-fid, pubescent. Petals valvate in æstivation. I have not had material for satisfactory analysis of the flower. The fruits are ovoid-globose, puberulous, on peduncles of ½–¾ in.; the epicarp tardily separating in 2–4 valves, from the bony, 1-celled, compressed pyrene, at one side of which internally are traces of the aborted cell. I do not observe any indication of the dimidiate arilliform layer of the pericarp referred to by Ehrenberg. This, however, is very conspicuous, surrounding some nuts sent to Kew by Colonel Playfair, stated to belong to a "Copal-tree," of Zanzibar. These nuts I take to be deprived of their epicarp. They are ½–¾ in. long, nearly black, smooth, and shining, slightly compressed, with a marginal suture, surrounded, one-third from the base, by a red-dish, fleshy, arilliform coat; 1-celled and 1-seeded by abortion, a prominent internal lateral projection marking the abortive cell. The seed is exalbuminous. Cotyledons contortuplicate. Radicle superior. Dr. Schweinfurth's plant I take to be a *Protium*. Identical generically with Dr. Schweinfurth's plant, described above, is a distinct species (*Protium? mossambicense*, Oliv.), sent from the Zambesi by Dr. Kirk, in fruit only. It may be distinguished thus:—Leaves 3-foliolate (rarely sub-5-foliolate), at length glabrescent; leaflets broadly ovate-rotundate, broadly pointed, subacute or obtuse, entire or faintly undulate; medium 3–3½ in. long, 1¾–3 in. broad, on a petiolule of ¾–1½ in., lateral 1½–2 in. long and broad, on petiolules of ¼–½ in. Fruits racemose from the axils of fallen leaves, broadly ellipsoidal or subglobose, about ½ in. in length; epicarp tardily 2-valved.

Order XXXVII. MELIACEÆ (by Professor Oliver).

Flowers regular, hermaphrodite or rarely unisexual by abortion. Calyx 4–5-lobed, -partite or -sepalous; segments usually imbricate. Petals as many, free, contorted or imbricate (in the African genera). Stamens usually 8–10, monadelphous (in the African genera). Anthers 2-celled, dehiscing longitudinally, sessile or stipitate, inserted upon or within the margin of the usually lobed dentate or fringed tube. Ovary free, usually surrounded by an annular free or adnate disk, 2–5–12-celled; style simple; stigma capitate or discoid. Ovules 2, occasionally 4–10. Fruit baccate or capsular. Seeds with or without albumen, in *Carapa* very large, angular, in *Khaya* subalate. —Trees or shrubs. Leaves alternate, exstipulate, simple, 3-foliolate or variously pinnate, epunctate. Flowers rather small, usually cymose, in compound racemes or panicles, occasionally umbellate, fascicled, geminate or rarely subsolitary.

A large Order, common to the warmer regions of both hemispheres. Two of the following genera (*Ekebergia* and *Khaya*) are peculiar to Africa. *Schizocalyx*, Hochst. in Flora, 1844, Beilage, p. 1, is referred to *Salvadoraceæ* by Planchon.

Leaves simple. Ovary 5–12-celled	1. Turræa.
Leaves 2-pinnate	2. *Melia.
Leaves pinnate or 3-foliolate.	
Ovules geminate. Fruit baccate	3. Ekebergia.
Ovules geminate. Fruit a capsule, dehiscing loculicidally	4. Trichilia.
Ovules 2–8. Staminal tube urceolate. Fruit (very large) opening in 4–5 valves, with thick angular-pyramidal seeds	5. Carapa.
Ovules 10–14. Fruit capsular. Seeds compressed or subalate	6. Khaya.

1. **TURRÆA,** Linn.; Benth. et Hook. f. Gen. Pl. i. 331.

Calyx cup-shaped, 5-toothed or 5-fid, persistent. Petals 5, oblanceolate-linear or spathulate, imbricate. Stamens 10, monadelphous. Anthers oblong or linear, apiculate, inserted in the mouth of the staminal-tube, included or exserted. Ovary 5–12-(20-)celled. Capsule with 5 or more cells, coriaceous or somewhat fleshy at first, globose or clavate.—Trees or shrubs. Leaves simple, alternate, petiolate, entire or lobulate. Flowers axillary, pedunculate or pedicellate, fasciculate umbellate or solitary.

A genus confined to the tropics of the Old World, the following species to the African continent.

Leaves, some at least, obovate-cuneate, 3-lobate above.
Flowers solitary or in pairs, axillary . . . . . 1. *T. heterophylla.*
Leaves elliptical, entire, apiculate or acuminate, glabrate. Umbels 2–∞-flowered; pedunculate. Staminal teeth subulate. Ovary 9–12-celled . . . . . 2. *T. Vogelii.*
Leaves elliptical, narrowed to each end, thinly pubescent beneath. Peduncles 2–4-flowered. Staminal tube crenate or entire. Ovary 5-celled . . . . . 3. *T. abyssinica.*
Leaves obovate obtuse, tomentose beneath. Umbellate many-flowered fascicles sessile. Staminal teeth triangular or oblong, entire or 2-fid. Ovary 10-celled . . . . . 4 *T. nilotica.*
Leaves oblanceolate or rhomboidal, entire or lobulate. Flowers solitary or 2 or 3. Staminal tube fimbriate. Ovary 5-celled . . . 5. *T. obtusifolia.*

1. **T. heterophylla,** *Sm.; DC. Prod.* i. 620. Leaves thinly membranous, usually more or less obovate-cuneate, 3-lobate above, with rectangular or obscure lateral lobes above the middle or varying to broadly obovate-oblong, subentire, obsoletely pubescent at least on the midrib below, 2–2½ in. long, 1–1½ in. broad; petiole 2 lines. Flowers ½–¾ in. long, solitary or in pairs from the upper axils, on peduncles of ¼–½ in. Calyx-teeth deltoid. Teeth of staminal tube apparently capillary. Ovary . . .?

Upper Guinea. Cape Coast, *Brass! Afzelius!*

Dr. Lindley in the 'Botanical Register' (xxx. t. 4) figures and describes a plant brought from Sierra Leone by Whitfield, under the name *T. lobata*, which is probably identical with the above. The ovary he states to be certainly 5-celled, while *T. heterophylla* is disposed by Mr. Bennett (Plantæ Javan. Rar. 184) under the section of the genus characterized by a 10–20-celled ovary. In other respects the resemblance between Dr. Lindley's figure and Smith's plant is very close. In *T. lobata* the teeth of the staminal tube are 20 in number, subulate, and arranged in 10 pairs. *T. quercifolia*, Don, Gen. Syst. i. 678, may be also cited as a synonym. Dr. Sonder, in 'Flora Capensis' (i. 245), identifies a Cape *Turræa* (*T. floribunda*, Hochst.) with Smith's plant, but I think he is mistaken.

2. **T. Vogelii,** *Hook. f. Fl. Nigrit.* 253. A shrub or small tree, often with elongate, rather slender, pubescent or glabrate branches. Leaves membranous, oblong-elliptical or broadly elliptical, shortly acuminate, more or less rounded or cuneate at the base, entire, glabrous excepting the midrib and principal veins, which are often puberulous or with hairy tufts at the axils; 2½–5 in. long, 1¼–2¾ in. broad; petiole 2–3 lines. Flowers on axillary peduncles, usually from ¾–2½ in. long, bearing from 2–8 or 10 umbellate

pedicels shorter than the peduncle, minutely bracteolate at the base. Calyx shortly 5-toothed. Petals oblanceolate or spathulate, whitish. Staminal tube $\frac{1}{3}$–$\frac{1}{2}$ in.; margin with subulate or filiform, entire or divided teeth, pilose or glabrous within. Anthers narrow-linear, exserted wholly or in part. Ovary 9–10–12-celled. Style exserted, with an oval-oblong dilatation and terminal obtuse stigma. Fruit, in our specimen, clavate, about 1 in. long, separating from above into as many coriaceous valves as cells.

Upper Guinea. Fernando Po, *T. Vogel!* and others; Prince's? Island, *Barter!*

Var. *propinqua.* Leaves rather smaller and narrower, oblong or oblanceolate-elliptical. —*T. propinqua,* Hook. f. Fl. Nigrit. 254; St. Thomas's, *Don!*

3. **T. abyssinica,** *Hochst.; Rich. Fl. Abyss.* i. 106. *t.* 25. Leaves membranous, elliptical, more or less narrowed above and below or acuminate, obtuse or rather acute, entire, glabrous above, thinly pubescent or glabrescent beneath, excepting on the principal veins or in their axils, 2–3½ in. long, ¾–1½ in. broad; petiole ⅛–¼ in. Flowers on 2–4-flowered axillary peduncles, ¼–½ in. long; pedicels bracteolate at or near the base, ¼–1 in. long. Calyx-lobes short, triangular. Staminal tube about ½ in. or less, shortly and broadly or crenately toothed or nearly entire, partially or wholly concealing the anthers. Ovary 5-celled. Style considerably exserted, ovoid- or globose-dilated under the stigmatic apex. Fruit a globose capsule, in some specimens rather fleshy at first.

Nile Land. Abyssinia, *Schimper!* and others.

Var. β. *longipedicellata.* Pedicels slender, 1 in. Leaves thin, about 3 in. long.—Aukober, Abyssinia, *Roth!*

4. **T. nilotica,** *Kotschy et Peyr. Pl. Tinn.* 12. *t.* 6. A small shrub or arborescent, attaining 20 ft. Branches rather stout. Leaves obovate or obovate-elliptical, obtuse retuse or scarcely pointed, more or less narrowed to the petiole, entire or undulate, shortly pubescent and soft to the touch above or at length glabrate, pubescent-tomentose and paler beneath, with the midrib prominent towards the base, 2–4 in. long, 1½–2 in. broad; petiole 2–4 lines. Flowers about ½ in. long, in many-flowered, umbellate, sessile, axillary and subterminal fascicles or terminating short, lateral ramuli; pedicels ⅛–½ in., minutely bracteolate at the base, pubescent. Calyx 5-fid; lobes triangular, rather acute. Petals narrowly oblanceolate, revolute or spreading. Staminal tube with a densely hairy ring inside; margin with short triangular or oblong, entire or 2-fid teeth, equalling or exceeding the anthers. Style about twice as long as the staminal tube. Ovary 10-celled. Stigma capitate, ovoid-conical, shortly hairy. (Fruit globose, sulcate, yellow, from a note by Dr. Kirk.)

Nile Land. Upper Nile, *Heuglin;* Gondokoro, *Knoblecher.*
South Central. Victoria Falls, Zambesi, *Dr. Meller!*
Mozamb. Distr. Shire river, *Dr. Kirk!*

5. **T. obtusifolia,** *Hochst. in Flora,* xxvii. 296. Shrub or small shrub-like tree, with slender, glabrous, leafy twigs, Leaves oblanceolate or rhomboid-oblanceolate, often with broad, obtuse, lateral lobes; apex obtuse or

rather acute, narrowed to the base, 1–1½ in. long, 2–3 lines to ½ in. broad or more; petiole very short. Flowers solitary or 2 or 3 from an obsolete axillary peduncle; pedicels equalling the calyx or varying to ¾ in. Calyx divided, about halfway or less, into 5 oblong-lanceolate or triangular rather acute teeth. Petals narrowed below, 1 in. long or rather longer. Staminal tube fimbriate, with spreading teeth. Anthers oblong, apiculate. Style very shortly exserted, shortly ovoid or oblong at the apex.

South Central. Lake Ngami, *M'Cabe!*

Also at Natal and other localities, south of the tropic. The tropical specimens have narrow entire leaves.

T. graciliflora, *Schlechtendal in Linnæa*, xxv. 217. Leaves ovate, narrowly and obtusely acuminate, narrowed to the base, entire, undulate or regularly or irregularly lobed or dentate; veins puberulous or pubescent, 3½ in. long, 1½ in. broad. Flowers few, shortly pedicellate on short peduncles. Calyx 5-fid. Staminal tube with nearly filiform teeth. Style much exserted, scarcely dilated; stigma convex, entire. Cells of ovary . . . ?

Described from a specimen of unknown origin, attributed to the African continent on the ground of its affinities. Perhaps identical with *T. heterophylla*, Sm., but I have not seen a specimen.

2. MELIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 332.

Calyx 5–(6-)partite; lobes imbricate. Petals as many as calyx-lobes, spreading, contorted in æstivation. Stamens 10–12, monadelphous. Anthers included within the slightly dilated 10–12-fid mouth of the cylindrical tube. Ovary 3–6-celled; style slender; stigma capitate. Ovules 2 in each cell, superposed. Fruit drupaceous, with a 1–5-celled bony putamen.—Trees. Leaves alternate, 2–3-pinnate (or simply pinnate). Panicles ample, axillary, usually collected towards the ends of the branches.

A small genus of India, the Archipelago, and Australia, one species (the following) widely dispersed by cultivation in warm countries.

*1. **M. Azedarach,** *Linn.; DC. Prod.* i. 621. Leaves 1–2 ft., 2-pinnate; leaflets lanceolate or varying from ovate-lanceolate to elliptical, acute or acuminate, serrate incise-serrate or subentire. Fruit with a 5-celled putamen or, by abortion, with fewer cells.—*M. angustifolia*, Schum. et Thonn. Guin. Pl. 214.

Upper Guinea. Sierra Leone, *Don!* Guinea, *Thonning;* Gambia, *Ingram!*

6. EKEBERGIA, Sparrm.; Benth. et Hook. f. Gen. Pl. i. 335.

Flowers polygamous. Calyx shortly cup-shaped, 5-fid. Petals 5, oblong, imbricate. Stamens 10, monadelphous; margin of the tube dentate. Anthers exserted. Ovary sessile, 2–5-celled. Fruit baccate, indehiscent, "2–5-celled. Cells 1-seeded. Seeds without an aril."—Trees. Leaves imparipinnate. Panicles of cymose flowers axillary.

A small genus, confined to Africa, one species occurring south of the tropic.

Ovary 5-celled . . . . . 1. *E. senegalensis.*
Ovary 2-celled . . . . . 2. *E. Rüppeliana.*

1. **E. senegalensis,** *A. Juss. Mém. Méliac.* 82. *t.* 17. *f.* 16 *a*. Leaves ½–1 ft. or longer, 5–11-foliolate; leaflets rather coriaceous, lateral opposite or nearly so, elliptical or oval-oblong, apiculate or rather broadly (sometimes very acutely, *Juss.*) pointed, rounded or somewhat narrowed at the base, very shortly petiolulate or subsessile, glabrous, paler or glaucous beneath, 1½–3 in. long, ¾–1¼ in. broad. Flowers cymose, in compound axillary racemes much shorter than the leaves, sessile or subsessile and clustered. Calyx-lobes broad and rounded or deltoid. Staminal tube denticulate. Ovary 5-celled. Fruit fleshy, about the size of a cherry.—Fl. Seneg. i. 127. t. 31.

Upper Guinea. Senegambia! *Leprieur.*

2. **E. Rüppeliana,** *Rich. Fl. Abyss.* i. 105. Leaves collected at the glabrous or, at first, tomentose-pubescent extremities, 5–9-foliolate, ½–1 ft. long or more; leaflets coriaceous or firmly membranous, lateral opposite or subopposite, elliptic- or ovate-lanceolate, acute or acuminate, base varying much in obliquity, entire or obsoletely undulate-crenate, glabrous, paler or glaucous beneath, 2–4 in. long, 1–1½ in. broad; petiolule 1–2 lines or less; terminal leaflet often ½–1½ in. beyond the last pair. Flowers cymose, in compound pedunculate racemes, from the axils of and much shorter than the upper leaves; pedicels very short. Calyx 5-fid, with ovate or deltoid lobes. Anthers linear-lanceolate. Ovary pilose, 2-locular. Fruit fleshy, globose. —*Trichilia Rüppeliana*, Fresen. in Mus. Senck. ii. 278. *Ekebergia Petitiana*, Rich. l. c. t. 24.

Nile Land. Abyssinia, *Rüppel, Schimper! Roth!* and others; Sennar, *Cienkowski!*

E. Petitiana, of Richard, is the more glabrous form of this species, and therefore corresponds more strictly with the plant originally described by Fresenius. I have seen specimens from the Richardian herbarium, collected by Dillon and Petit, communicated by Count Franqueville.

E. Meyeri, Presl, a Cape species, is doubtfully distinct.

4. TRICHILIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 337.

Calyx short, 4–5-toothed -fid or -partite. Petals 4–5, erect or spreading, imbricate. Stamens 8–10, monadelphous; filaments free more or less above or united to the apex, entire or with a lateral tooth on each side of the anther. Disk free or adnate to the base of the tube or ovary. Ovary 2–3-celled; style simple, short or elongate, with a capitate stigma. Ovules geminate. Capsule 2–3-celled, dehiscing from above loculicidally; cells 1 2-seeded. Seeds "with a fleshy arillus."—Trees or shrubs. Leaves imparipinnate or 3-foliolate. Flowers cymose, in axillary panicles or compound racemes, often collected near the ends of the branches.

A considerable genus, including numerous tropical American species. Some of the following species, in the absence of the fruit, must remain uncertain as to genus.

Filaments united to the apex. Leaflets 5–7, acuminate or apiculate, glabrous. Flowers 1½–2 lines . . . . . 1. *T. Prieuriana.*
Filaments free in the upper half.

Filaments entire (not 2-fid) at apex. Leaflets 9–11, acute or acuminate. Flowers ⅓ in.	2. *T. Heudelotii.*
Filaments 2-fid at the apex (a lateral tooth at each side of anther).	
Leaflets 3–5, retuse-truncate, glabrous. Flowers ¼ in. Ovary 2-celled	3. *T. retusa.*
Leaflets 7–11, obtuse, pubescent beneath. Flowers ¾ in. diam. Ovary 3-celled	4. *T. emetica.*
Leaflets acute or acuminate.	
Leaflets about 9, 6–16 in. long, glabrous. Flowers 1–1½ in. diam. Ovary 2-celled	6. *T.? grandifolia.*
Leaflets 9–11, 6–8 in. long, glabrous. Flowers 1½–2 lines. Ovary 3-celled	7. *T.? rubescens.*
Leaflets 9–15, 1–3 in. long, pubescent. Flowers 1½–2 lines.	5. *T. capitata.*

1. **T. Prieuriana,** *A. Juss. Mém. Méliac.* 124. Leaves 5–7-foliolate, glabrous; leaflets rather coriaceous, drying pale green, lateral alternate or subopposite, elliptical or oblong-elliptical, shortly and obtusely acuminate or apiculate, rounded or cuneate at the base, 3–4 in. long, 1½–2 in. broad, or terminal leaflets 6 in. by 2½ in.; petiolules 1–4 lines. Flowers 1½–2 lines, in very short axillary panicles of ½–2 in. often branched from the base; subsessile or pedicels shorter than the 5-fid calyx. Calyx-lobes ovate. Filaments united to the apex. Anthers sessile. Disk adnate to the staminal tube. I have not succeeded in making out the structure of the ovary, which Jussieu describes as 3-celled, Guillemin and Perrottet as 2-celled.—Fl. Seneg. i. 125. t. 30.

Upper Guinea. Senegambia! Lagos, *Barter!*

2. **T. Heudelotii,** *Planch. in Herb. Kew.* Leaves 9–11-foliolate, rather large, rachis puberulous or glabrate; leaflets usually approximate in pairs, rather coriaceous, oblong- or oblanceolate-oval, acuminate, more or less narrowed or rounded at the base, glabrous or very nearly so, entire, lateral veins prominent beneath; the upper and terminal leaflets larger, attaining 4–7 in. in length, 1½–2 in. in breadth or a little more; petiolules 1–3 lines. Flowers about ⅓ in. in length, in numerous nearly simple or compound short racemes of 2–3 in., crowded at the extremities from the axils of ordinary or reduced leaves; pedicels usually shorter than the flower or flowers subsessile. Calyx 5–4-fid, with ovate-deltoid lobes, early deciduous. Filaments connate half their length, entire or not distinctly toothed at the apex, hairy above. Ovary 3(–4)-celled, with the ovules in pairs. Fruit not seen.

Upper Guinea. Senegambia! Sierra Leone, *Morson!* Fernando Po, *Mann!*

3. **T. retusa,** *Oliv.* A tree of 40 ft. with fragrant white flowers. Leaves 6–8 in., 3–5-foliolate, glabrous; leaflets coriaceous, narrowly oblanceolate- or oval-oblong, abruptly retuse-truncate, narrowed to the base, entire, midrib prominent beneath, 3–4 in. long, 1–1½ in. broad; petiolules 2–3 lines. Flowers ⅓ in. long, cymose, in axillary panicles or from the axils of reduced or squamiform leaves at the ends of the branches, 1–4 in. long. Calyx 4–5-partite with ovate obtuse lobes. Filaments united half their length, pilose above; apex 2-fid; anthers linear. Ovary 2-celled with geminate ovules. Fruit coriaceous, sessile or subsessile, separating in two valves,

about 1 in. in diam. Seeds oblong, ¾ in. long, subtrigonous with a rounded back.

Upper Guinea. Nupe by the Niger, *Barter!*

4. **T. emetica,** *Vahl; DC. Prod.* i. 622. Tree, with the growing extremities pubescent. Leaves 7–11-foliolate, pubescent beneath, ½–1½ ft. long; leaflets coriaceous, lateral opposite or subopposite, usually oblong-elliptical, varying from oblanceolate- to ovate-oblong, very obtuse, base more or less rounded rarely subcordate, glabrescent above, pubescent beneath, with rather numerous and prominent lateral nerves, upper leaflets 2½–6 in. long, 1–2½ in. broad, occasionally larger; petiolules 1–2 lines or 0. Flowers ¾ in. when expanded, usually crowded or cymosely clustered, in short axillary panicles of 1–6 in. Calyx 5-partite or 5-sepalous; segments rotundate. Petals imbricate. Filaments united to the middle, hairy within above; apex 2-fid. Ovary 3-celled with geminate ovules. Fruit ½–1 in. in diam., globose or globose-clavate, shortly stipitate, separating in 3 coriaceous valves (or fewer by abortion); stipes thick, 1 or 2 lines to ½ in. Seeds oblong "with a scarlet arillus."—*Mafureira oleifera*, Bert. Misc. Bot. ix. 6. t. 2. *Geniostephanus tomentosus*, Fenzl in Flora, 1844, 312. *Rochetia choënsis*, Delile in Roch. ii^e^ Voy. Bot. n. 47 (*fide* Richard).

Upper Guinea. Sierra Leone! Senegambia! (? Niger, *Barter*).
Nile Land. Madi, White Nile, *Speke and Grant!* Sennar, *Kotschy!* Abyssinia.
South Central. Upper Zambesi, *Dr. Kirk.*
Mozamb. Distr. Zambesi, from the coast upwards and Shire river, *Dr. Kirk!* Rovuma river, *Dr. Kirk.*

The oil and tallow obtained from the seeds, Dr. Kirk states is valuable and may be had in quantity. The oil is used in cookery. I have little hesitation in referring the rather numerous specimens in the Kew herbarium from the localities above quoted to one species, though whether the Arabian plant (*Elcaja*) of Forskäl be the same is another matter. Forskäl's description agrees tolerably well, and Jussieu had no doubt as to the specific identity of the W. African and Arabian plants.—*T. Dregeana*, E. Mey., may turn out a variety of this species.

5. **T. capitata,** *Klotzsch in Peters' Mossamb. Bot.* 120. Extremities pubescent. Leaves 9–15-foliolate, 9–12 in. long, pubescent or at length nearly glabrous at least above; leaflets alternate or subopposite, ovate or ovate-lanceolate, acute or acuminate, base rounded, sometimes broadly, more rarely cuneate, obscurely undulate-crenate or subentire, 1½ 3 in. long or the lower about 1 in., ¾ 2 in. broad; petiolules 1 line more or less. Flowers 1½–2 lines, in pedunculate axillary corymbose or subcapitate cymes, with the peduncle (when elongate usually unbranched below) ½–4 in. long. Calyx 5-fid. Petals imbricate. Filaments united about one-third, deeply 2-fid at the apex, the subulate teeth rather shorter than the anthers. Disk free. Ovary probably 3-celled, with geminate ovules. Fruit globose, ½ in. or less in diam., dehiscing in 3 or 2 valves. Seeds 6 or fewer.

Mozamb. Distr. Zambesi and Shire, *Drs. Kirk and Meller! Peters!*

6. **T. ? grandifolia,** *Oliv.* Leaves about 9-foliolate, ample, rachis terete, as thick as a stout quill; leaflets firmly membranous, 6–16 in. long, 3½–5 in. broad, ovate-oblong or oblong-elliptical, acuminate, base broadly

rounded or even truncate; petiolules ¼-½ in. or of the terminal leaflet 1 in. Flowers 1–1¼ in. in diam. when expanded, in short, axillary, loosely branching panicles or compound racemes. Calyx 5-partite; lobes rotundate. Petals rather thick, obtuse, patent, 6–8 lines long. Filaments united one-third to one-half their length, hairy above on the inner side and margins; apex 2-fid; teeth nearly equalling the anthers. Disk adnate to the staminal tube. Ovary hairy, 2-locular; ovules geminate. Fruit not seen.

Upper Guinea. St. Thomas's, *Mann!*

7. **T.? rubescens,** *Oliv.* A tree of 12–15 ft. Leaves 1–2 ft. long, 9–11-foliolate, with a terete puberulous or glabrate rachis; leaflets alternate or subopposite, rather coriaceous, oblong-elliptical or -oblanceolate, shortly and acutely acuminate, glabrous or sparsely puberulous beneath on the principal nerves, 6–8 in. long, 2–2½ in. broad; petiolules 2–3 lines. Flowers "yellow," 1½–2 lines, in corymbose cymes collected in axillary, sometimes elongate panicles of 5–12 in.; pedicels equalling the calyx or shorter. Calyx shortly cupulate, 5-partite, with broad rotundate or transversely oblong lobes. Filaments shortly 2-fid at the apex, united about half their length, hairy within. Disk thick, fleshy, free. Ovary 3-celled with geminate ovules. Fruit not seen.

Upper Guinea. Fernando Po and Ambas Bay, *Mann!*

Limonia? monadelpha, Schum. et Thonn. Guin. Pl. 217, as suggested by Dr. Planchon (Fl. Nigrit. 255), is probably a *Trichilia*, but I can only guess as to the species.

5. CARAPA, Aubl.; Benth. et Hook. f. Gen. Pl. i. 338.

Calyx 5- or 4-partite or -lobed; lobes rotundate, short. Petals as many as divisions of the calyx, contorted in æstivation. Stamens monadelphous; anthers 8–10, included, alternate with the entire apiculate or emarginate teeth of the urceolate tube. Ovary 4–5–6-celled, surrounded by an annular partially free or adherent disk; style short, thick; stigma discoid. Ovules about 2–8 in each cell. Capsule large, somewhat fleshy or woody, at length opening in 4–5 valves. Seeds large, more or less pyramidally angled by mutual pressure, 2 or more in each cell. (I have not examined seeds in a fresh state.)—Trees, perfectly glabrous, with large multifoliolate imparipinnate or smaller abruptly pinnate, coriaceous leaves. Flowers in axillary panicles, cymose.

A genus of 2 or 3 species, one of which appears to be common to both Eastern and Western tropical shores of the Atlantic.

Leaves imparipinnate, multifoliolate. Teeth of staminal tube entire or emarginate. Ovules 4–7 in each cell . . . . . 1. *C. guyanensis.*
Leaves 2-(3-1-)jugate. Teeth of staminal tube rounded, apiculate. Ovules 2–4 in each cell . . . . . 2. *C. moluccensis.*

1. **C. guyanensis,** *Aubl.; DC. Prod.* i. 626. Leaves multifoliolate, imparipinnate, 2–4 ft. in length, principally collected at the extremities of the branches; leaflets subopposite or alternate, broadly oblong or oblong-

elliptical, apex rounded, shortly apiculate or mucronate, the upper usually 5–12 in. long, 1½–4 in. broad; petiolules very short or obsolete or from ¼–½ in., very thick in the larger leaves. Panicles many-flowered, ½–2 ft. or longer; lateral branches spreading, short or elongate. Flowers in cymose clusters; pedicels various, very short or slightly exceeding the flower. Teeth of the staminal tube rounded or subquadrate, entire or slightly emarginate. Ovary 5–4–6-celled, immersed in a thick annular disk with a rounded free margin. Ovules 4–7 in each cell. Fruit about 4–5 in. in diam., subglobose. The seeds afford an oil used by the natives.—*C. guineensis*, G. Don in Loud. Hort. Brit. 168; A. Juss. Mém. Mél. t. 9. f. 21. *C. Touloucouna*, Guill. et Perr. Fl. Seneg. i. 128 (see also Rœmer, Syn. Hesp. i. 122–3).

Upper Guinea. Senegambia! Sierra Leone, *Barter!* Fernando Po, *Barter! Mann!* Niger, *Barter!* Ambas Bay, *Mann!*

I have compared specimens in flower as well as fruits preserved in the Kew Museum from tropical America and West Africa, and I cannot find any specific difference between them. The distinctions noted by Perrottet and quoted by A. Jussieu, I have little confidence in, and Jussieu himself suspected that they might belong to one species. The Senegambian *Carapa* is described as a large tree; further south, according to Barter's labels, it occurs as a small one.

2. **C. moluccensis,** *Lam.; DC. Prod.* i. 626. A perfectly glabrous littoral tree or shrub. Leaves 4–8 in., 2-jugate, rarely 1- or 3-jugate, or one of the lateral leaflets deficient; leaflets coriaceous elliptical- or oblanceolate-oblong, obtuse, usually cuneate or narrowed to the petiole, 2½–5 in. long, 1–1½ in. broad. Flowers cymose, in short racemose axillary or subterminal panicles or nearly simple racemes usually much shorter than the leaves. Pedicels divaricate, thickened upwards, equalling or exceeding the flower. Calyx 4- or 5-partite with rounded lobes. Teeth of staminal tube broad, obtuse, apiculate. Ovary 4-celled, the base surrounded by an adnate scarlet disk; ovules 2–4 in each cell. Fruit about the size of a child's head; the pericarp separating in 4 valves. Seeds very large, angular, with "a thick corky" testa (*Kirk*).—*Xylocarpus Granatum*, Kœn.; Willd. Sp. Pl. ii. 328.

Mozamb. Distr. Mouth of the Zambesi, *Dr. Kirk!*

Occurs eastward in Madagascar, Ceylon, the Malayan Archipelago, and Northern Australia. The tree affects muddy shores, throwing out from the base of the trunk numerous vertically flattened radiating plates (Dr. Kirk).

6. KHAYA, A. Juss.; Benth. et Hook. f. Gen. Pl. i. 338.

Sepals 4, rotundate, small, imbricate. Petals as many, contorted. Stamens 8, monadelphous; tube 8-lobed at the mouth, lobes rounded, entire; anthers included. Ovary 4-(3-)celled, surrounded by an annular disk, narrowed into the style; stigma discoid. Ovules 10–14 in each cell, biseriate. Capsule woody, separating septicidally. Seeds numerous, compressed or winged, albuminous.—A large tree. Leaves abruptly pinnate. Panicles from the upper axils.

A genus founded upon a Senegambian plant of which I have not seen authentic specimens. It appears to be well figured in Guillemin and Perrottet, and in Jussieu's Memoir,

and I have ventured to refer to the same species specimens in the Kew herbarium from the White Nile and Zambesi region.

1. **K. senegalensis,** *A. Juss. Mém. Mél.* 98. *t.* 10. A large glabrous tree. Leaves 4–10-foliolate, 6–12 in. long; leaflets coriaceous, subopposite or alternate, elliptic-oblong or -lanceolate, shortly and obtusely apiculate, rounded or sometimes cuneate at the base, entire or undulate-denticulate, petiolulate, 2½–3½ in. long, 1–1½ in. broad; petiolule ¼–½ in. Panicles shorter than or nearly equalling the leaves, with ascending or spreading lateral branches decreasing in length from below. Flowers cymose, usually in threes, or peduncles trichotomous. Pedicels shorter than the flower. Bracts minute, ovate-deltoid. I have not seen fruit, but Dr. Kirk secured a drawing of what I take to be one, in which the woody pericarp separates from above in 4 valves, septicidally, from the 4-angled axis, as figured by Jussieu from the Senegal plant. Seeds "flat, winged, in 2 rows."—Fl. Seneg. t. xxxii. *Swietenia senegalensis*, Desr. Encycl. (ex A. Juss.).

Upper Guinea. Abundant near Cape Verde and on the Gambia (*Guillemin and Perrottet*).

Nile Land. Madi, White Nile (form with sparse inflorescence, drying pale green), *Speke and Grant!*

Mozamb. Distr. ? Manganya hills, Zambesi, *Dr. Meller!*

Until fruiting and flowering specimens shall have been matched, doubt must attach to the above stations in Eastern Africa. G. and P. describe the petals as almost valvate, surely through mistake.

Order XXXVIII. CHAILLETIACEÆ (by Prof. Oliver).

Flowers hermaphrodite or rarely unisexual. Sepals 5, connate below or free, equal or unequal, imbricate. Petals as many, more or less exceeding the calyx, free and equal or more rarely connate with the stamens at the base (or in *Tapura* nearly throughout), usually more or less unguiculate, 2-fid or 2-partite. Stamens 5, alternate with the petals (or united in *Tapura* and very shortly in some species of *Chailletia*); anthers 2-celled, elliptical to linear, the connective often dorsally thickened. Hypogynous glands opposite to the petals, free or connate. Ovary free (partly or wholly inferior in a few species of *Chailletia*), 3-2-celled; style simple (in African species), 3- or 2-fid at the apex. Ovules geminate. Drupes dry or rarely fleshy, the epicarp sometimes opening, 3–1-celled, 3–1-seeded. Seeds exalbuminous, radicle superior.—Small trees or shrubs, sometimes climbing. Leaves alternate, simple, entire, stipulate. Flowers small, cymose, dichotomous or fascicled, axillary; peduncles rarely adnate to the petiole.

A small Order nearly exclusively confined to the tropics.

Petals distinct or very shortly united at the base, equal. Antheriferous stamens 5 . . . . . 1. Chailletia.

Petals united with the stamens into a tube, rather unequal. Antheriferous stamens 8 . . . . . 2. Tapura.

1. CHAILLETIA, DC.; Benth. et Hook. f. Gen. Pl. i. 341.

Flowers hermaphrodite, rarely unisexual. Calyx 5-partite; lobes nearly or quite equal, more or less imbricate. Petals 5, free, usually more or less clawed, 2-fid or 2-partite, rarely very shortly united with the stamens into a tube at the base. Stamens 5; anthers elliptical to linear, the connective frequently thickened behind. Hypogynous glands 5, distinct or connate, opposite to the petals. Ovary free or in a few African species partially or wholly immersed, 3–2-celled; style simple (in tropical African species); apex shortly 3–2-fid. Fruit drupaceous, dry or rarely fleshy, 1–3-celled, 1–3-seeded.—Small trees or shrubs, erect or scandent, glabrous or pubescent. Leaves alternate, entire, petiolate or subsessile. Stipules subulate or setaceous, deciduous. Flowers small, usually white, in axillary pedunculate or nearly sessile cymes or glomerules.

A considerable tropical genus both of the Old and New World. The tropical African species appear to be distinct from any Asiatic or American species which I have seen. The species characterized by an ovary more or less immersed may perhaps prove entitled to generic distinction, but their fruits are unknown.

A very distinct species occurs south of the tropics, within the limits of the Cape Flora.

Ovary superior.

Leaves glabrous or glabrescent beneath.

Branches shortly tomentose. Leaves coriaceous, oblanceolate-oblong, obtuse or broadly acute. Cymes shortly pedunculate. Petals with long claw . . . . . 1. *C. flexuosa.*

Branches glabrous, puberulous or thinly strigillose.

Extremities slender, thinly strigillose. Leaves oval- or oblanceolate-oblong, acuminate. Cymes under 1 in., pedunculate. Petals scarcely clawed. (Fruit fleshy.) . . 2. *C. cymulosa.*

Puberulous. Leaves broadly- or obovate-elliptical, acute or obtuse; base entire. Cymes many-flowered, 1–3 in., dichotomous. Petals with long claw . . . . . 3. *C. floribunda.*

Puberulous or glabrous. Leaves broadly elliptical, obtuse or broadly acute, shining; base subcordate. Cymes under 1 in., 3–5-fid, subscorpioid. Petals with long claw . . . . . 4. *C. subcordata.*

Glabrous or puberulous. Leaves oblong-oval or -elliptic, obtusely acuminate; base acute. Glomerules few-flowered, on short peduncles, often racemose on axillary flowering shoots. Petals shortly clawed . . . . . 5. *C. toxicaria.*

Glabrous. Leaves oblong-elliptic, acuminate, base acute; 2½–5 in. Cymes 1–1½ in., lax, branched. Petals with long claw . . . . . 6. *C. oblonga.*

Glabrous. Leaves elliptic-oblong, acute; base rounded or cuneate; 6–8 in. Cymes sessile. Claw about equalling the sinus . . . . . 7. *C. Thomsoni.*

Leaves tomentose or pubescent beneath.

Base of the leaf distinctly cordate. Leaves obovate-elliptical, broadly acute or obtuse, pilose or pubescent beneath. Cymes pedunculate. Calyx-lobes recurved . . . . . 8. *C. mossambicensis.* (Compare *C. rufipilis*, var.)

Base of the leaf slightly or not at all cordate.

Branches rusty-hirsute. Leaves obovate-elliptic. Cymes subsessile. Calyx-lobes erect. Petals slightly narrowed . . . . . 9. *C. rufipilis.*

Branches rusty-pilose. Cymes subsessile. Calyx-lobes spreading. Petals with long claw . . . . . 10. *C. reflexa.*
Shortly tomentose. Leaves with a close pale tomentum beneath, glabrous above. Cymes subsessile. Claw of petals short . . . . . 11. *C. pallida.*
Ovary more or less distinctly adherent to the calyx-tube. Glomerules sessile or subsessile. Flowers usually 3-bracteolate.
Branches hirsute or tomentose.
Leaves oblanceolate, 8–11 in.; base obtuse, unequal. Calyx-lobes linear, acute. Ovary two-thirds inferior . . . . 12. *C. macrophylla.*
Leaves obovate- or oblanceolate-oblong, 4–5 in.; base obtuse or unequally cordate. Calyx-lobes elliptical. Ovary wholly inferior . . . . . 13. *C. hispida.*
Leaves (glabrescent) oval-oblong, 3–6 in.; base narrow, scarcely subcordate. Ovary one-third to half inferior . . 14. *C. Heudelotii.*
Branches puberulous.
Leaves (glabrous) obovate-elliptical, 4–6 in.; base very narrowly cordate. Ovary half inferior . . . . . 15. *C. subauriculata.*

1. **C. flexuosa,** *Oliv.* Extremities slightly flexuose, pale or cinnamon-tomentose at first. Leaves coriaceous, petiolate, distichous, oblanceolate-oblong, shortly and obtusely cuspidate or acute, usually more or less narrowed to a cuneate base, glabrate, with rather rough reticulation above when dry, at first thinly pubescent, at length nearly glabrous beneath, 3–4 in. long, 1–1½ in. broad; petiole 2–3 lines. Stipules minute, rigid, subulate. Flowers in axillary shortly and stoutly pedunculate cymes, ½ in. long or little more; pedicels white-tomentose, scarcely equalling the calyx. Calyx-lobes erect, oblong-elliptical, obtuse. Petals narrow, with 2-fid lamina and long claw. Ovary free, narrowed into the style.

Upper Guinea. Abbeokuta, *Irving!*

2. **C. cymulosa,** *Oliv.* A shrub of 6 ft. Leafy extremities slender, at first sparsely strigillose-pubescent, soon glabrous. Leaves petiolate, thinly coriaceous, brown-black when dry, oblanceolate-oblong, shortly acuminate, base narrowly rounded or subcuneate, entire, thinly strigillose on the nerves beneath on expansion, early glabrous, principal lateral veins few, looping; 2½–4½ in. long, 1–1½ in. broad; petiole about 1 line. Stipules setaceous. Flowers very small, in shortly pedunculate axillary cymes. Peduncle, before branching, slender, straight, 2–3 lines; bracts minute, setaceous or subulate; pedicels 1–2 lines or shorter. Petals free, obovate, 2-fid, slightly narrowed below or shortly unguiculate, but little exceeding the oblong or oblong-lanceolate calyx-lobes. Ovary pilose, 3-celled. Fruit fleshy, about the size and form of a Plum, 1–1½ in. long and nearly as broad, smooth, glabrous, 1–3-celled, 1 3-seeded, the pulp adhering to the thin testa. Radicle superior, with converging grooves to its base on the plane face of the cotyledons.

Upper Guinea. Camaroons river, *Mann!*

3. **C. floribunda,** *Planch. in Hook. Ic. Pl.* 792. A climber, attaining 20 ft. or sometimes arborescent; extremities puberulous, tawny or ashen-grey. Leaves firmly membranous, usually ample, broadly elliptical or obovate-elliptical, with a short, obtuse or acute cusp or acumen, base broadly cuneate

or rounded, entire, glabrous or the midrib above and petiole strigillose; 5–10 in. long, 3–4½ in. broad; petiole ¼–½ in. Stipules subulate, deciduous. Flowers fragrant, in ample, many-flowered, rather lax, dichotomous, axillary cymes 2–3 in. long and broad or 2 or 3 confluent; pedicels articulated, hoary-pubescent, very short or equalling the flower or calyx. Calyx-lobes oblong-lanceolate, obtuse, ascending. Petals free, narrowed below, 2-fid. Ovary pilose or pubescent, narrowed into the slender style.

Upper Guinea. Fernando Po, *T. Vogel!* and others.

Var. *β.* A small tree. Leaves rather coriaceous, smaller than in the type, thinly pubescent. Dichotomous cymes shorter. Young fruit subdidymous in our specimen.

Abbeokuta and Lagos, *Barter!* Cape Coast, *Brass!*

? Var. *γ.* Extremities with a short cinnamon-tomentum. Leaves thinly coriaceous, at first sparsely hirsute. Calyx-lobes spreading or recurved. Probably a distinct species.

Prince's Island, *Mann!*

4. **C. subcordata,** *Hook. f. Fl. Nigrit.* 277. Shrub, with finely puberulous extremities. Leaves subcoriaceous, broadly elliptical, glabrous or at first puberulous on the nerves beneath, shining above, broadly acute apiculate or obtuse, base subcordate or rounded, sometimes broadly, and entire; 3½–6 in. long, 2½–4 in. broad; petiole 1–3 lines. Stipules subulate. Flowers somewhat scorpioid, in small axillary, very shortly pedunculate, 4–5-fid cymes, scarcely 1 in. long; bracts short, subulate. Petals free, much narrowed below. Ovary pubescent or pilose, narrowed into the slender style; stigmas 3.

Upper Guinea. Fernando Po, *T. Vogel! Mann!*

I have not had sufficient material to enable me to frame a satisfactory description.

5. **C. toxicaria,** *Don; DC. Prod.* ii. 57. A glabrous shrub or the young shoots and inflorescence mealy-puberulous at first. Leaves rather coriaceous, petiolate, oval-oblong, shortly and obtusely cuspidate or acuminate, base acute or cuneate, glabrous, 2½–6 in. long, 1½–2½ in. broad, occasionally rather larger; petiole ¼–⅓ in. Stipules minute, subulate, deciduous. Flowers 2 lines long or little more, in small glomerules, either subsessile and axillary or adnate to the petiole or racemose from a straight common peduncle sometimes 1–2½ in. long, a small leaf frequently subtending the glomerules. Pedicels equalling or shorter than the calyx, the ovate-elliptical lobes of which are erect. Petals shortly 2-fid, free. Ovary villous; styles minutely 3-fid. Fruit 1–1½ in. long, ellipsoidal, hard and woody, 1-celled, 1-seeded.—*C. erecta*, Don; DC. Prod. ii. 58? *C. affinis*, Planch. Fl. Nigrit. 276.

Upper Guinea. Sierra Leone, *T. Vogel!* and others; Senegambia!

Var. *elliptica.* Leaves proportionally broader, very shortly and obtusely apiculate; base sometimes rounded.

Bagroo river, *Mann!*

I have not seen authentic specimens of Don's plant, but there can be little doubt of the identity of our specimens. The seeds are said to be poisonous. We have specimens in bud of an allied species from the Niger (*Barter*), very similar to var. *elliptica*, but with a different form of cymose inflorescence and the petals minutely or unequally 2-fid. Whether a variety or distinct species is uncertain.

Rhamnus paniculatus, Schum. et Thonn. Guin. Pl. 131 (*Ceanothus? guineensis*, DC. Prod.

ii. 30) is, as pointed out by Mr. Bentham in Fl. Nigrit., a *Chailletia*. The description does not enable me to distinguish it from *C. toxicaria*.

An allied plant, perhaps a new species, from Cape Coast (*Brass*), is in the herbarium of the British Museum.

6. **C. oblonga,** *Hook. f. Fl. Nigrit.* 277. Shrub. Extremities slender, glabrous or at first minutely puberulous. Leaves petiolate, oblong- or slightly obovate-elliptical, shortly rather obtusely acuminate, base acute or cuneate, usually drying pale green, glabrous, 2½–5 in. long, 1–2⅔ in. broad; petiole 1½–3 lines. Stipules subulate. Flowers 2–3 lines, in small, lax, branching, axillary cymes of 1–1½ in.; pedicels equalling the calyx more or less; bracts very minute. Calyx-lobes erect, oblong. Petals free, narrowed into a long pilose claw; lamina 2-partite. Ovary tomentose-pubescent; style long, filiform, shortly and obtusely 2-lobed at the apex. Fruit obovoid-oblong, tomentose, about 1½ in. long in our specimen.

Upper Guinea. Fernando Po, *T. Vogel! Barter! Mann!*

7. **C. Thomsoni,** *Oliv.* A small tree with glabrous or glabrescent extremities. Leaves petiolate, oblong-elliptical, rather coriaceous, acute or shortly acuminate, base rounded or broadly acuminate, 6–8 in. long, 2–3 in. broad; petiole ¼ in. Flowers 2–3 lines, in axillary, sessile or subsessile, cymose, hoary-pubescent fascicles, scarcely twice exceeding the petiole; pedicels equalling or shorter than the flowers, with minute lanceolate-subulate bracts. Calyx-lobes erect. Petals 2-partite. Ovary pilose, narrowed into the slender style shortly 3-fid at the apex.

Upper Guinea. Old Calabar, *W. C. Thomson!*

8. **C. mossambicensis,** *Klotzsch in Peters' Mossamb. Bot.* 108. *t.* 19. Leafy branches pilose or hirsute with spreading hairs exceeding a short pubescence. Leaves subsessile or very shortly petiolate, obovate-elliptical or -oblong, rather broadly acute or obtuse, mucronate or shortly apiculate, distinctly cordate at the base, with scattered appressed hairs and soft or at length scabrid above, paler pubescent or at first tomentose beneath, 3–6 in. long, 1⅓–2¾ in. broad. Stipules setaceous or filiform. Flowers in axillary pedunculate cymes, 1–2 in. long; bracts setaceous; pedicels slender, pilose, articulated above, 1–3 lines long. Calyx-lobes obtuse, whitish-tomentose externally, at length recurved. Petals free; lamina obovate, 2-partite, narrowed at the base. Ovary villous, 3-celled; style short.

Mozamb. Distr. Mozambique, *Peters!* Rovuma river, *Dr. Kirk!*

9. **C. rufipilis,** *Turcz. in Bull. Mosc.* xxxvi. (1863) 611. A climber, attaining 15–20 ft.; leafy branches rusty-hirsute. Leaves shortly petiolate or subsessile, obovate-elliptical or oblong-elliptical, acute or apiculate, base obtuse rounded or slightly cordate, entire, scabrid-pubescent thinly hispid or glabrate above, midrib setose-hairy, paler or white and shortly hoary-tomentose beneath, the nerves darker and coarsely hairy; 2–4 in. long, ¾–2 in. broad; petioles 0–3 lines. Stipules subulate-setaceous. Flowers about 3 lines long in rather dense very shortly pedunculate cymes or flowers fewer and nearly sessile; pedicels ½–1½ lines; bracts setaceous. Calyx-lobes erect,

white-edged when dry. Petals free or nearly so, slightly narrowed below or sessile, shortly 2-fid. Ovary covered with a long loose soft felt.

Upper Guinea. Camaroons river, *Mann!*
Lower Guinea. Congo (var. with smaller leaves), *Smith!*

The small-leaved plant, from the Congo, may be a variety of *C. mossambicensis*, but the Camaroons form appears sufficiently distinct in its more distinctly petiolate leaves scarcely or not at all subcordate, erect calyx-lobes, etc.

10. **C. reflexa,** *Klotzsch in Peters' Mossamb. Bot.* 109. *t.* 20. Shrub. Extremities covered with a short rusty or cinnamon tomentum; ultimate ramuli spreading distichously at right angles. Leaves (imperfectly developed in our specimen) elliptic-oblong, acute or shortly acuminate, apparently rounded or obtuse at the base, softly pilose-pubescent at first, at length probably glabrate above, 1½–2½ in. long, ¾–1 in. broad; petiole very short, much exceeded by the linear-subulate stipules. Flowers in axillary very shortly pedunculate or subsessile cymes; bracts subulate. Calyx-lobes spreading. Petals elongate-spathulate, 2-fid, much narrowed to the base. Ovary and lower part of slender style pilose or pubescent, 2-celled. Fruit oblique, pubescent or tomentose, 1-celled, 1-seeded.

Mozamb. Distr. Near Mozambique, *Peters;* Rovuma river, *Dr. Kirk!*

The Rovuma plant is determined from Dr. Klotzsch's figure and description.

11. **C. pallida,** *Oliv.* A small shrub; young shoots shortly tomentose. Leaves shortly petiolate, broadly oval or elliptical, acute, base slightly rounded or narrowly obtuse, glabrous above, closely appressed white-tomentose beneath, 2½–3½ in. long, 1¼–1¾ in. broad; petiole 1–1½ lines. Flowers in very shortly pedunculate or subsessile, axillary, cymose fascicles about equalling the tomentose pedicels. Lamina of the petals 2-partite. Ovary villous, with a short style, minutely 3-fid at the apex.

Upper Guinea. Niger, *Barter!*

12. **C. macrophylla,** *Oliv.* Shrub or small tree, annual shoots rather densely rusty pilose-hirsute. Leaves membranous, elongate, oblanceolate- or obovate-oblong, acuminate, narrowed to the base, which is very narrowly obtuse or unequally subcordate, entire, early glabrous, 8–11 in. long, 2–3½ in. broad. Petiole 1–3 lines, at first hirsute. Flowers in sessile, hirsute, axillary glomerules, each with 3 lanceolate acute bracteoles. Calyx-lobes linear, acute. Petals sublinear, very narrow, recurved and 2-fid above, very shortly connate with the stamens below. Anthers linear. Ovary nearly inferior, apex hairy; style glabrous, 3-fid at the apex.

Upper Guinea. Kongui river, *Mann!*

13. **C. hispida,** *Oliv.* A climber attaining 30 ft. Leafy branches roughly hispid with patent hairs. Leaves subsessile or petiole 1 line, oblanceolate- or obovate-oblong, acuminate, rounded more or less to the base, which is obtuse and very narrowly and unequally subcordate, glabrous excepting the strigillose midrib beneath. Flowers in sessile axillary glomerules, 3-bracteolate. Calyx 5-partite; segments oblong or elliptical. Petals

shortly 2-fid, obovate or elliptical, shortly clawed, very shortly united with the stamens in a tube at the base. Glands minute, rather fleshy, 2-lobulate. Ovary inferior.

Upper Guinea. Kongui river, *Mann!*

14. **C. Heudelotii,** *Planch. in Herb. Kew.* Extremities pubescent or hirsute-tomentose. Leaves rather coriaceous, oval-oblong, acute or acuminate, slightly curved to the base, which, at the insertion of the petiole, is slightly oblique and tending to subcordate, glabrescent above and below or midrib at first strigillose, 3–6 in. long, 1–2 in. broad. Petiole 1–2 lines. Flowers in sessile axillary glomerules; pedicels 0 or very short, 3-bracteolate at the base. Calyx-lobes oblong-lanceolate, obtuse. Petals narrowed below, 2-fid. Ovary partially immersed. Style glabrous; apex very shortly 3-fid.

Upper Guinea. Senegambia! Bagroo river, *Mann!*

15. **C. subauriculata,** *Oliv.* A shrub of 6–8 ft. Extremities slender, puberulous at first, early glabrescent. Leaves firmly membranous, shortly petiolate, obovate-elliptical, acuminate or cuspidate, base very narrowly cordate with the short lateral lobes sometimes partially overlapping the petiole, glabrous, 4–6 in. long, 2–3 in. broad; petiole 1–3 lines. Flowers in subsessile axillary glomerules often scarcely exceeding the petiole. Pedicels very short or 0, usually 3-bracteolate. Calyx-lobes ovate-oblong, obtuse. Petals much narrowed below; lamina deeply 2-fid. Ovary half-inferior, narrowed above into a slender glabrous style, 3-fid at the apex.

Upper Guinea. Old Calabar, *Mann!*

2. **TAPURA,** Aublet; Benth. et Hook. f. Gen. Pl. i. 341.

Calyx 5-partite, 2 outer lobes smaller. Petals 5, cohering with the stamens into an unequally 5-lobed tube, 2 of the lobes 2-fid, 3 entire. Stamens alternating with the lobes of the corolla, 3 two-celled perfect, 2 effete. Ovary sessile, 3–2-celled. Style filiform, with a shortly 3–2-fid apex. Fruit unknown.—Shrubs or small trees. Leaves entire. Stipules minute, deciduous. Flowers in small, axillary, shortly pedunculate glomeruli, the peduncle adnate to the subtending petiole.

A small genus, with the following exception confined to tropical America.

1. **T. africana,** *Oliv.* A tree of 20 ft. Slender extremities sparsely puberulous at first, soon glabrous. Leaves thinly coriaceous, oblanceolate- or obovate- to oblong-elliptical, more or less, often rather abruptly, acuminate, narrowed to a cuneate base, entire, glabrous or sparsely pubescent at first on the nerves beneath, principal lateral nerves few (2–4) on each side of the midrib, 5–6 in. long, 1¾–2½ in. broad; petiole ½–⅝ in. Peduncle rather shorter than or equalling the petiole and wholly adnate to it. Flowers small, sessile or shortly pedicellate, in a rather dense small glomerule.

Upper Guinea. Fernando Po, *Mann!*

Order XXXIX. **OLACINEÆ** (by Prof. Oliver).

Flowers regular, hermaphrodite or unisexual. Calyx small, 4–5-toothed -fid or -partite, occasionally nearly entire or obsolete, unchanged or accrescent in fruit. Petals 4–5, free or connate more or less, usually valvate in æstivation. Stamens 4–10, rarely 12–40, free or united below more or less to the petals, rarely monadelphous; anthers 2-celled. Disk cupuliform entire or lobed, rarely unilateral, or 0. Ovary free or the lower part immersed, 1-celled or 3–5-celled, the dissepiments frequently incomplete above (solid in *Ptychopetalum*). Style simple. Ovules solitary in each division of the ovary (rarely several in each cell) or geminate in 1-celled ovaries, pendulous. Fruit 1-celled, 1-seeded, dry or drupaceous, indehiscent. Seed usually with a copious fleshy albumen, rarely exalbuminous; embryo minute, apical, or shorter than or nearly equalling the albumen, with foliaceous cotyledons.—Trees or shrubs, erect or scandent. Leaves alternate, entire or nearly so, usually penniveined; exstipulate. Inflorescence various. Flowers small.

Sect. 1. **Olaceæ.**—*Stamens more numerous than the petals (except in Strombosia). Ovary 3–5-celled, at least below (solid in Ptychopetalum). Ovules solitary in each division of the ovary (except in Rhaptopetalum).*

Calyx accrescent. Stamens twice as many as petals	1. Heisteria.
Calyx unchanged. Stamens twice as many as petals	2. Ximenia.
Calyx obsolete. Stamens 5–8. Ovary solid	3. Ptychopetalum.
Calyx unchanged or accrescent. Stamens 8–9 (3–5 anantherous)	4. Olax.
Calyx accrescent. Stamens as many as petals and opposite	5. Strombosia.
Stamens four times the petals. Ovules solitary	6. Coula.
Stamens 30–40, monadelphous. Ovules about 6 in each cell	7. Rhaptopetalum.

Sect. 2. **Opilieæ.**—*Stamens as many as petals and opposite. Ovary 1-celled, 1-ovuled. Calyx minute, unchanged. (Racemes at first strobiliform.)*

8. Opilia.

Sect. 3. **Icacineæ.**—*Stamens as many as petals and alternate. Ovary 1-celled (in African genera).*

Anthers tufted. (Flowers capitate in umbellate peduncles)	9. Lasianthera.
Anthers glabrous. (Flowers in elongate spikes)	10. Desmostachys.
Petals united nearly throughout. Filaments adnate	11. Leptaulus.
Petals glabrous or nearly so, free	12. Apodytes.
Petals glabrous, connate ⅓–½ from base. Stamens free	13. Alsodeiopsis.
Petals bearded. Embryo with foliaceous cotyledons	14. Icacina.

Sect. 4. **Phytocreneæ.**—*Scandent shrubs. Leaves opposite. Flowers diœcious. Perianth simple (in African species)* 15. Iodes.

1. **HEISTERIA,** Linn.; Benth. et Hook. f. Gen. Pl. i. 346.

Flowering-calyx small, 5–6-toothed or -lobed, in fruit much enlarged. Petals 5–6, valvate in æstivation, more or less hairy within. Stamens twice as many as petals, free or adnate to the petals below; anthers small rotundate or didymous. Ovary fleshy, 3-celled nearly or quite to the apex; ovules solitary, pendulous. Fruit a globose or oblong drupe. Seed albuminous,

with a minute embryo.—Glabrous shrubs or trees. Leaves alternate, entire, coriaceous. Flowers small, sessile or pedicellate in the axils.

A tropical American genus with the following exception. The generic description is from the 'Genera Plantarum;' our African specimens being insufficient for independent examination.

1. **H. parvifolia,** *Smith; DC. Prod.* i. 533. Perfectly glabrous. Leaves oblong-elliptical, acuminate, acumen usually rather obtuse, slightly rounded or cuneate at base, 3½–5 in. long, 1⅛–2 in. broad; petiole ¼–½ in. Flowers (not examined) shortly pedicellate, in axillary fascicles. Fruit-calyx 5-partite, about 1–1½ in. in diam.; lobes ovate, spreading or ascending, rather acute, after the fall of the fruit with the sinuses reflexed.—*Acrolobus Schœnleinii* and *A. parvifolius*, Klotzsch in Schœnl. Nachl. 236–7. t. 3.

Upper Guinea. Sierra Leone, *Afzelius! Whitfield!* (? Fernando Po and Grand Bassa, *T. Vogel!*) Coast of Guinea, *Young!*

Mann collected on the Kongui river an *Olacinea* which may probably belong to the same species. The leaves are from 5–7 in. long by 1½–3 in. broad. Flowers in axillary fascicles shorter than the petiole, the pedicels equalling or exceeding the flower. Calyx shortly cupuliform, 5-toothed. Petals coherent in their lower half. Stamens 10; filaments opposite to the petals, which are shortly pilose above within, shorter than the alternating ones, adnate below. Anthers small, rotundate. Ovary depressed above with a short thick style, 3-celled, with 1 ovule in each cell.

2. **XIMENIA,** Linn.; Benth. et Hook. f. Gen. Pl. i. 346.

Calyx small, 4–5-toothed or -lobed, unchanged in fruit. Petals 4–5, valvate in æstivation, narrow-oblong, bearded within. Stamens 8–10; filaments filiform, free; anthers linear, erect, dehiscing longitudinally. Ovary more or less completely 3–4-celled; style continuous; stigma obtuse; ovules 3 or 4, narrow-linear, pendulous, one in each division. Fruit a drupe. Seed albuminous with a minute apical embryo.—Shrubs or trees, glabrous or tomentose, often armed with short axillary spines. Leaves alternate, entire. Flowers in axillary fascicles or cymose racemes, rarely solitary.

A small genus with one species apparently peculiar to the Cape, and a second, widely diffused through tropical countries, occurring in numerous localities in intertropical Africa.

1. **X. americana,** *Linn.; DC. Prod.* i. 533. A glabrous shrub or tree, with or without short, acute, axillary spines. Leaves coriaceous, oval-oblong or occasionally elliptical, obtuse, often slightly emarginate, base usually cuneate; 1½–3 in. long, ¾–1⅓ in. broad; petiole 2–3 lines. Flowers whitish, ⅛–½ in. long, in few-flowered, shortly pedunculate, racemose or umbellate cymes, much shorter than the leaves; pedicels ebracteate, shorter than or equalling the flowers. Calyx with 4 short deltoid lobes. Petals densely bearded within. Ovary 4–3-celled nearly to the apex of the cavity. Fruit ellipsoidal, 1–1¼ in. long (edible, scarlet, *Dr. Kirk*).—*X. laurina*, Delile in Ann. Sc. Nat. Sér. 2. xx. 88; Ferret and Galinier, Voy. iii. 100. (*Vide* Bentham, Fl. Austral. i. 391.)

Upper Guinea. Sierra Leone, *Hutton!* Senegambia, *Heudelot!* Niger, *Barter!*

Nile Land. Abyssinia, *Schimper!* and others; White Nile, *Speke and Grant!* Sennar, *Cienkowski.*

Lower Guinea. Angola, *Dr. Welwitsch!*

Mozamb. Distr. Zambesi, *Dr. Kirk!*

Var. *β. microphylla* (Welwitsch). A glaucous virgate shrub of 2–4 ft. Leaves ½–¾ in. Calyx-lobes shortly and broadly ovate. Style short. Bumbo, Angola, *Dr. Welwitsch!* A remarkable variety.

3. PTYCHOPETALUM, Benth.; Benth. et Hook. f. Gen. Pl. i. 346.

Calyx obsolete. Petals 5 (4–6), narrow, valvate in æstivation, more or less pilose or bearded within about the middle. Stamens 7 or 5–8, opposite to the petals, when more numerous than the petals 2–6 are inserted in pairs; filaments adnate more or less to the petals, usually longer in the supernumerary stamens; anthers small, elliptical. Ovary free, glabrous, solid or with slight trace of a cavity near the apex, gradually or abruptly narrowed into the style (ovule solitary, adnate to the wall of the ovary? or, according to Mr. Bentham, ovules 2 (or 3?), very small, pendulous). Fruit a small crustaceous drupe, 1-seeded. Seed albuminous with a minute embryo within the apex.—Shrubs or small trees, glabrous. Leaves alternate, acuminate, entire. Flowers in few-flowered, axillary racemes.

* A small and imperfectly understood genus, including, besides the following, one Cayenne species. The above description is based upon the African specimens.

So far as our material enables me to judge, *Ptychopetalum* may be regarded as a *Loranthacea* with the ovary free from the calyculus or rather not immersed in the axis. M. Baillon remarks the analogy between this genus and *Loranthus* in respect to the internal structure of the ovary.

Extremities terete or nearly so. Leaves elliptical to ovate-lanceolate, acuminate; petiole 1–2 lines . . . . . 1. *P. petiolatum.*

Extremities 2-edged. Leaves sessile or subsessile, oval-oblong, acuminate . . . . . 2. *P. anceps.*

1. **P. petiolatum,** *Oliv.* A shrub of 12–15 ft.; leafy extremities terete or nearly so. Leaves coriaceous, elliptical elliptic-oblong or ovate-lanceolate, gradually acuminate, base rounded or broadly cuneate, at length narrowing into the petiole; principal lateral veins 3–5, broadly looping considerably within the margin, often inconspicuous; 3–4 in. long, 1¼–1¾ in. broad; petiole 1–2 lines. Flowers in very short axillary racemes; pedicels rather shorter than the buds. Petals 4–5, shortly bearded within about the middle, recurved near the top. Stamens 5, opposite to the petals or 7, 2–6 being adnate in pairs. Ovary glabrous, rather abruptly narrowed at the base of the style. Fruit not seen.

Upper Guinea. Muni and Kongui rivers, *Mann!*

Apparently very near to the S. American *P. olacoides,* Benth., which differs in a more distinct calyculus and in the nervation of the leaves.

2. **P. anceps,** *Oliv.* A small tree. Leafy extremities compressed or distinctly 2-edged when dry. Leaves sessile or subsessile, coriaceous, oval-oblong, acuminate, base slightly cordate or entire, more or less rounded, 3½–4½ in. long, ¾–1½ in. broad. Flowers in very short axillary racemes;

pedicels shorter than the flowers, subtended by a lanceolate cymbiform caducous bract. Calyx obsolete. Petals 5, very narrow-linear, more or less barbate within. Stamens 8 (or thereabout), opposite and adnate to the petals, 6 in pairs, 1 of each pair being longer and free above. Ovary oval-oblong, slightly sulcate, gradually narrowed into the style. Fruit ellipsoidal or globose-obovoid, $\frac{1}{3}$–$\frac{1}{2}$ in. long; pericarp coriaceous.—*Athesiandra anceps*, Miers, mss. and *Anisandra nigrescens*, Planch. mss. in Herb. Kew.

Upper Guinea. Var. *α*. Leaves sessile, slightly cordate at the base. Grand Bassa, *T. Vogel!* Var. *β*. Leaves sessile or subsessile, more or less rounded or subcuneate at base. Bagroo river, *Mann!*

It is quite probable the two forms distinguished above as varieties may be specifically distinct, but our material is too slight to settle the question. Unfortunately there is but a single attached fruit and one already opened (belonging to var. *β*, the flowers of which alone I have dissected), that I cannot satisfy myself as to the position of the embryo.

4. OLAX, Linn.; Benth. et Hook. f. Gen. Pl. i. 347.

Calyx cupuliform, entire or nearly so, accrescent and enclosing the free fruit or unchanged. Petals 5 or 6, valvate in æstivation, free or slightly coherent or connected by alternating filaments. Stamens usually 8 (or 9), (in tropical African species) of which either 5 are anantherous and opposite to the petals, and 3 antheriferous alternate with them, or 5 antheriferous opposite to the petals, and 3 anantherous and alternate. Filaments more or less adnate to the petals. Ovary free, more or less distinctly 3-celled at the base, sometimes distinctly 1-celled above, narrowed into the style; stigma obtuse or capitate, sometimes 3-lobed; ovules 1 in each division of the ovary. Fruit drupaceous, 1-seeded, or pericarp coriaceous, naked or enclosed within the accrescent calyculus. Seed albuminous with a minute, apical, oblong embryo (in the only tropical African species examined with ripe fruit). —Glabrous shrubs or small trees. Leaves alternate, entire or nearly so, often with decurrent lines from the petiole. Flowers small, in short racemes, or the common peduncle nearly obsolete, rarely solitary.

A considerable genus of the tropics of the Old World with a few Australian outliers. The African species appear to be endemic, unless one prove identical with a Madagascar species.

Antheriferous stamens 3, alternate with the petals; staminodia 5, opposite.
- Leaves 3–6 in., oblong-elliptical acute or acuminate. Flowers in very short racemes (common peduncle $\frac{1}{10}$–$\frac{1}{4}$ in.); pedicels $\frac{1}{2}$–1 line, much exceeding the bracts . . . . . 1. *O. Mannii.*
- Leaves 3–4 in., elliptical, rather obtuse. Flowers in distichous racemes of $\frac{1}{4}$ in.; bracts equalling very short pedicels . . . 2. *O. viridis.*
- Leaves sessile, ovate-lanceolate, acuminate . . . . . 3. *O. gambecola.*
- Leaves 6–7 in., oblong elliptical, prominently 3-nerved to beyond the middle. Racemes short . . . . . 4. *O. triplinervia.*

Antheriferous stamens 5–6, opposite to the petals; staminodia 3, alternate.
- Leaves oval-oblong, acute, 2$\frac{1}{2}$–3$\frac{1}{2}$ in. Flowers in 1-sided or distichous racemes of $\frac{1}{2}$–$\frac{3}{4}$ in. Pedicels 1 line or less . . . . 5. *O. subscorpioidea.*
- Leaves lanceolate, 1–1$\frac{1}{2}$ in. Flowers solitary, axillary (or in short racemes). Pedicels $\frac{1}{4}$ in. . . . . 6. *O. dissitiflora.*

1. **O. Mannii,** *Oliv.* A glabrous shrub of 6–8 ft. Leafy branches subterete with short, more or less prominent, decurrent lines from the leaf-bases. Leaves firmly membranous or thinly coriaceous, very shortly petiolate or subsessile, oblong-elliptical or -lanceolate, acute or acuminate, rounded or cuneate at the base, entire or repand-denticulate towards the apex; principal lateral veins subdistant, broadly looping some little distance within the margin, not very prominent; 3–6 in. long, 1–2¾ in. broad; petiole 1–2 lines or less. Flowers in very short axillary racemes or fasciculate. Common peduncle $\frac{1}{10}$–$\frac{1}{4}$ in. Pedicels $\frac{1}{2}$–1 line; bracts ovate or rotundate, much shorter than the pedicels. Calyx shortly cupuliform, subentire. Stamens usually 8, 5 anantherous, opposite to the petals, 3 antheriferous, alternating with the petals, all more or less adnate. Ovary 3-celled below. Fruit wholly enclosed within the rather loose, coriaceous, accrescent calyx, $\frac{1}{2}$–$\frac{3}{4}$ in. in diam., globose or depressed globose. Pericarp coriaceous.

Upper Guinea. Old Calabar, Camaroons river, and Sierra d. Crystal, *Mann!*

2. **O. viridis,** *Oliv.* A small shrub. Extremities sulcate or angular with faint decurrent lines; punctate with minute whitish dots. Leaves submembranous, elliptical, more or less narrowed or acuminate to the obtuse or scarcely acute apex, narrowed at the base into the petiole and subsessile, obscurely repand-denticulate towards the extremity or entire, 3–4 in. long, 1¼–1¾ in. broad. Flowers waxy, white or chocolate-coloured, 1–1½ lines long, in axillary distichous racemes of ½ in. or less; bracts ovate or lanceolate, about equal to or exceeding the very short pedicels. Calyx shortly cupuliform. Stamens 8, 5 usually anantherous, opposite to the petals, 3 antheriferous, alternate. Ovary 3-celled below; stigma subcapitate. Fruit globose, about the size of a pea, naked, the small unchanged calyx persisting at the base.

Upper Guinea. Eppah, Niger, *Barter!*
Lower Guinea. Golungo Alto, Angola, *Dr. Welwitsch!*

The Niger specimens are not in fruit.

I think this plant must be nearly allied to *O. gambecola*, which, however, is described as "floribus magnis" and "fructu subnudo," etc.

3. **O. gambecola,** *Baillon in Adans.* iii. 121. Shrubby. Leaves membranous, sessile, broadly ovate-lanceolate, acuminate, entire, veiny. Flowers large, racemose; racemes axillary, lax. Base of the ovary immersed, 3-celled. Fruit small, nearly naked, globose, glabrous.

Upper Guinea. Senegambia, *Heudelot.*

Description taken from M. Baillon's memoir. I have not seen a specimen.

4. **O. triplinervia,** *Oliv.* A glabrous shrub of 6 ft. Extremities subterete with decurrent lines from the leaves. Leaves rather coriaceous, oblong-elliptical, narrowed to each end, more or less acuminate, basal pair of lateral nerves rather prominently continued, about ¼ in. within the margin, more than half the length of the leaf; 6 7 in. long; 2 2¾ in. broad; petiole very short or obsolete, the lamina being narrowed nearly to the base. Flowers in short, axillary, apparently distichous racemes; pedicels very short, exceeding the ovate bracts. Calyx shortly cupuliform. Petals 6 (or 5). Stamens

9 (or 8), those opposite to the petals antheriferous, with complanate filaments, the odd ones anantherous. Ovary 3-celled at the base. Young fruit wholly enclosed within the accrescent calyx.

Upper Guinea. Mount John, Kongui river, *Mann !*

5. **O. subscorpioidea,** *Oliv.* A shrub. Decurrent lines more or less marked in the leafy branches. Leaves rather coriaceous, oval-oblong or from lanceolate to oval, acute, base slightly rounded or cuneate, 2½–3½ in. long, ¾–1¼ in. broad; petiole 1 line or less. Racemes ½–¾ in. long, tapering. Axillary flowers "white," distichous, usually turned to the upper side; pedicels much shorter than the flowers, about equalling the caducous bracts. Calyx cupuliform, entire. Stamens 8, 5 antheriferous, opposite to the petals, 3 anantherous, alternate. Ovary 3-celled below. Fruit not seen.

Upper Guinea. Onitscha, Niger, *Barter !*

6. **O. dissitiflora,** *Oliv.* A small glabrous shrub. Leafy extremities terete with obsolete decurrent ridges. Leaves rather coriaceous, lanceolate or oblong-lanceolate, acute or rather obtuse, base cuneate or slightly rounded, 1–1½ in. long, ½–¾ in. broad; petiole 1–2 lines. Flowers "white," in short axillary racemes or, usually, the racemes lengthening out into leafy ramuli, solitary in the axils of the lower leaves or obsolete bract-scales of the shoot; pedicels ¼ in. more or less. Calyx cupuliform, entire. Stamens 8, 5 opposite to the petals, anantherous, 3 alternate, antheriferous. Ovary distinctly 3-celled below, 1-celled above, narrowed into the style; stigma capitate-3-lobulate. Young fruit enclosed in the accrescent calyx, obovoid or ellipsoidal.

Mozamb. Distr. Tette, Zambesi; and Lake Nyassa, *Dr. Kirk !*
Nearly allied to, if not identical with, a Madagascar plant (Bouton in Herb. Kew).

5. **STROMBOSIA,** Blume; Benth. et Hook. f. Gen. Pl. i. 348.

Calyx-limb small, 5-lobed; lobes broadly ovate or deltoid-rotundate, in fruit enlarged, adnate. Petals 5, perigynous, valvate. Stamens as many as, and opposite and adnate to, the petals; filaments shortly free above. Ovary broad, inserted upon a disk or the base more or less immersed, 3–5-celled nearly to the apex; style short; stigma obtuse, slightly thickened, obscurely lobulate; ovules pendulous, 1 in each compartment. Fruit (not seen in the African plant) drupaceous, oblong. "Seed pendulous with a minute embryo within the apex of a fleshy albumen."—Glabrous trees. Leaves alternate, coriaceous. Flowers small, in axillary cymes or fascicles, pedunculate or sessile.

A small Indian genus to which there is little doubt that the following species belongs, although the fruit and fruit-calyx are yet wanting.

1. **S. ? grandifolia,** *Hook. f. Fl. Nigrit.* 258. A tree of 15–20 ft.; leafy branches terete. Leaves ample, coriaceous, petiolate, broadly oblong-elliptical, shortly acuminate or cuspidate, rounded or broadly cuneate at base; veinlets connecting the principal lateral veins obscure, nearly parallel, forking; 5–8 in. long, 2–4 in. broad; petiole ½ in. Flowers very small, very

shortly pedicellate from axillary sessile cushions. Calyx-limb shortly 5-lobed: lobes ovate-deltoid. Petals elliptical, broadly pointed, pilose within above. Ovary broad, surrounded by an inconspicuous disk; base partially immersed, 3-celled nearly to the top; style subulate.

Upper Guinea. Fernando Po, *T. Vogel! Mann!*

Specimens of what may be a second species of *Strombosia* are in the Kew herbarium, from the Sierra del Crystal (*Mann!*), but scarcely sufficient for description.

6. COULA, Baillon in Adansonia, iii. 64.

Flowers hermaphrodite. Calyx reduced to a very short nearly entire ring. Petals 5 (rarely 4), free, thick, valvate. Stamens hypogynous, free, four times as many as petals, unequal; filaments erect, subulate. Ovary free, 3 4-celled below, 1-celled above, narrowed into a subulate style; ovules solitary in each division of the ovary. Fruit drupaceous, 1-celled, 1-seeded. Seed pendulous; albumen fleshy; embryo minute.—A tree. Leaves alternate, petiolate, coriaceous. Flowers in axillary or supra-axillary, branched racemes, about equal to the petioles.

Based upon the following species, of which I have not seen a specimen. The description is taken from M. Baillon's account of it.

1. **C. edulis,** *Baill. l. c. t.* 3. Leaves ovate, abruptly acuminate, rounded or cuneate at the base, 3–4 in. long, 2 in. broad; petiole about ½ in. long. Racemes rusty-puberulous; pedicels slightly thickened above. Fruit subglobose, 1–1½ in. in diam.

Upper Guinea. Gaboon, *Aubry LeComte!*

7. RHAPTOPETALUM, Oliv.; Benth. et Hook. f. Gen. Pl. i. 995.

Calyx cupuliform, entire or lobulate, unchanged in fruit. Petals 3, perigynous, coriaceous, glabrous, valvate in æstivation. Stamens indefinite (30–40); filaments short, united below in a tube adnate to the base of the petals; anthers erect, narrow-linear, dehiscing by a short longitudinal slit near the apex. Ovary slightly immersed or "half-inferior," 4-celled; style filiform; stigma minute; ovules about 6 in each cell of the ovary, pendulous. Fruit oblong or ellipsoidal, coriaceous, 1-celled, 1-seeded.—A glabrous tree. Leaves coriaceous, alternate, entire. Flowers in axillary, few-flowered, very short racemes or subumbellate fascicles.

A monotypic genus, apparently confined to W. equatorial Africa. Notwithstanding the number of ovules in each cell of the ovary, which indicates an affinity with *Styracaceæ* as pointed out to me by M. Baillon, I leave this plant in *Olacineæ*, as in most other respects, but especially in habit, it accords so well with the latter family. It forms, however, an interesting connecting link between the two groups.

1. **R. coriaceum,** *Oliv. in Journ. Linn. Soc.* viii. 159. *t.* 12. A glabrous tree, attaining 30 ft. Branches terete, with slightly prominent raised lines, decurrent from the petioles. Leaves coriaceous, elliptical, shortly and obtusely produced at the apex, base rounded or cuneate, entire, midrib and sometimes the lateral veins rather prominent beneath; 3 5 in. long, 1¾–3¾

in. broad; petiole 1–2 lines. Flowers in very short 3–7-flowered axillary racemes; common peduncle scarcely exceeding 1–3 lines or obsolete and flowers fascicled or subsolitary; pedicels 1½–2 lines. Petals very coriaceous, 3–4 lines long. Fruit ellipsoidal, ¾ in. long or a little more. Calyx persistent unchanged.

Upper Guinea. Fernando, Po, *Mann!* Old Calabar, *Thomson!*

8. OPILIA, Roxb.; Benth. et Hook. f. Gen. Pl. i. 350.

Calyx minute, 4–5-toothed, unchanged in fruit. Petals 4–5, hypogynous, valvate in æstivation. Stamens as many as petals and opposite to them, free or very shortly adnate to the base of the petals; filaments filiform. Ovary terete, 1-celled, with a short thick style and obtuse stigma, surrounded by a 5–4-partite, free, fleshy disk; ovule solitary, pendulous. Fruit drupaceous, with a thin crustaceous pericarp. Seed albuminous; embryo linear, terete, nearly as long as the albumen (or "short in the apex of the albumen" in extra-African species).—Shrubs, often scrambling or subscandent, glabrous or shortly pubescent-tomentose. Leaves alternate, coriaceous, entire. Racemes axillary, at first strobiliform, with deciduous peltate bracts. Flowers minute, pedicellate.

A small genus of the Old World tropics. I find no sufficient ground to maintain the African species as distinct from the widely-spread *O. amentacea*, Roxb.

1. **O. amentacea,** *Roxb. Pl. Coromand.* ii. 31. *t.* 158. A loosely climbing shrub or small tree, glabrous or the extremities shortly pubescent-tomentose. Leaves coriaceous, oval-oblong lanceolate or elliptical, acute shortly acuminate or in some forms obtuse or rarely emarginate, cuneate or more or less rounded at the base, entire, venation obscure or lateral veins sometimes rather prominent beneath, 1–4½ in. long, ¾–1½ in. broad; petiole 1 3 lines. Racemes at first strobiliform, obtuse, solitary or 2–5 together from the axils of the leaves, at length growing out to 1–1½ in., ascending or spreading, tomentose puberulous or nearly glabrous. Flowers greenish, fragrant. Bracts transversely oblong-rotundate, peltate, caducous. Pedicels 1 line more or less. Petals recurved or revolute above on expansion. Lobes of the disk fleshy. Fruit ellipsoidal, ½ ¾ in. long or subglobose in some extra-African forms. Embryo nearly as long as the albumen, linear-terete.—*Grotlia celtidifolia*, Guill. et Perr. Fl. Seneg. 101. t. 22. *Opilia celtidifolia*, Endl. in Walp. Rep. i. 377. *Opilia javanica*, Miquel, Fl. Ind. Bat. i. 784.

Upper Guinea. Senegambia! Niger, *Barter!*
Nile Land. Madi, White Nile, *Speke and Grant!* Sennar, *Kotschy!*
Lower Guinea. Pungo Andongo, Angola, *Dr. Welwitsch!*

Var. *β. tomentella.* Leaves smaller, usually obtuse; extremities shortly tomentose.

Mozamb. Distr. Zambesi, *Dr. Kirk!*

Also in India, the Archipelago, and N. Australia.

Dr. Kirk sends, from Zanzibar, what may prove a distinct species of *Opilia*. The reticulation of the leaves is very obscure, and the flowers, in the single inflorescence sent, are collected in a somewhat umbellate raceme.

9. **LASIANTHERA,** P. de Beauvois; Benth. et Hook. f. Gen. Pl. i. 350.

Flowers hermaphrodite (or polygamous). Calyx shortly and broadly 5-lobed. Petals 5, hypogynous, valvate in æstivation (united below in the following species). Disk fleshy, unilateral (or inconspicuous). Stamens 5, alternate with the petals, free or adnate at the base to the petals; anthers tufted behind with a pencil of soft hairs. Ovary free, 1-celled, narrowed above; stigma minute. Ovules geminate, pendulous. Fruit coriaceous, oblong, compressed (perhaps only seen abortive in the following species). "Seed pendulous, with a small embryo within the apex of a fleshy albumen." —Glabrous trees or shrubs. Leaves alternate, entire. Flowers small, capitate; peduncles umbellate, leaf-opposed.

A small genus, confined to the tropics of the Old World. The African species is endemic.

1. **L. africana,** *P. de Beauv.; DC. Prod.* i. 636. A glabrous shrub of 10–12 ft.; extremities terete. Leaves submembranous, obovate- or oblanceolate-oblong, finely and often rather abruptly acuminate, narrowed to the petiole and more or less cuneate at the base, entire or obsoletely denticulate, 3–4 in. long, 1 to nearly 2 in. broad; petiole 2–3 lines. Peduncles extra-axillary or leaf-opposed, ½–1 in., dividing into 3–5 umbellate branches. Flowers 1½–2 lines, in close heads ¼–⅓ in. across. Calyx cupuliform, broadly 5-lobed. Hypogynous disk or gland unilateral, fleshy. The only fruits which I have seen are oval-oblong, compressed, incurved, nearly ½ in. long, but perhaps imperfect.—Fl. Owar. t. 51.

Upper Guinea. Near Chama, Gold Coast, *P. de Beauvois;* Fernando Po and Gaboon river, *Mann!*

10. **DESMOSTACHYS,** Planch.; Benth. et Hook. f. Gen. Pl. i. 350.

Calyx small, deeply 4-lobed (or cupuliform, 5-toothed). Petals 4(–5), thin, oval or oblong, valvate in æstivation. Stamens as many as petals, alternate; filaments filiform or slightly compressed; anthers rotundate or subdidymous (or oblong), minute, glabrous. Disk inconspicuous or 5-lobed. Ovary obovate, rather suddenly narrowed into the slender filiform style; stigma small, subcapitate. Ovules geminate, pendulous. Fruit not seen.—Small trees or shrubs, sometimes scandent, glabrous or sparsely pubescent. Leaves membranous or coriaceous, alternate, entire. Flowers small, sessile, in elongate, slender, solitary or fasciculate axillary spikes.

A small genus, confined to tropical Africa and Madagascar.

Leaves submembranous, 5–7 in. Spikes 3–15 in. Anthers minute, rotundate. Ovary glabrous	1. *D. tenuifolius.*
Leaves veiny, coriaceous, 2–4 in. Spikes shorter than leaves. Anthers oblong. Ovary pilose	2. *D. Planchonianus.*

1. **D. tenuifolius,** *Oliv.* A shrub or small tree, varying from 10–30 ft.; extremities glabrous or nearly so. Leaves submembranous, petiolate, ob-

long-elliptical or obovate-oblong, rather abruptly and acutely cuspidate or shortly acuminate, cuneate or rounded at the base, entire, distantly penniveined, 5–7 in. long, 1¾–3 in. broad; petiole ¼–½ in. Spikes slender, solitary or two or three together from the axils or supra-axillary, from 3–15 in. in length, shortly pubescent or the pubescence at length disposed in one or two lines or upon the edges of the slightly compressed rachis. Flowers white, about 1½ lines, sessile, ebracteate, spreading, singly scattered in a single line or distichous, often in various stages of development at the same part of the spike. Calyx 4-partite. Anthers minute, rotundate. Ovary very small, obovoid. Fruit not seen.

Upper Guinea. Fernando Po, *Barter!*

Var. β. Spikes shorter than the leaves, Small Itobi Island, *Mann!*

It appears to me rather probable that *Sarcostigma Vogelii*, Miers (Contrib. Bot. i. 104. t. 19) may be referable to this species. The only specimens in Herb. Kew are destitute both of flower and fruit.

2. **D. Planchonianus,** *Miers, Contrib. Bot.* i. 68. *t.* 9. Scandent. Extremities terete. Leaves coriaceous, shining above, obovate-oblong to oblong or oval-oblong, shortly and rather obtusely apiculate, cuneate or slightly rounded at the base, rather prominently penniveined, entire, glabrous, 2–4 in. long, 1¼–1½ in. broad; petiole about 2 lines. Spikes slender, shorter than the leaves in our specimens, solitary or two or three together, pubescent. Flowers 1½ lines, minutely bracteate. Calyx 4–5-fid, with ovate lobes. Anthers shortly oblong. Ovary densely pilose.—*D. nitidus*, Planch. in Herb.

Mozamb. Distr. Mozambique, *Forbes!*

Also in Madagascar.

11. LEPTAULUS, Benth.; Benth. et Hook. f. Gen. Pl. i. 351.

Calyx deeply 5-lobed; lobes slightly imbricate. Petals 5, united nearly to the apex; lobes valvate, with inflexed tips. Stamens 5, alternate with the corolla-lobes; filaments adnate nearly throughout. Disk 0. Ovary 1-celled, slightly oblique above; style filiform; stigma slightly dilated, minute; ovules geminate, pendulous. Fruit a coriaceous, oblong-ovoid, pointed drupe, 1-celled, 1-seeded. Seed pendulous, sulcate on one face, tuberculate-rugose; embryo...?—A glabrous shrub. Leaves alternate, entire, rather coriaceous. Flowers in extra-axillary, many-flowered, subumbellate, very shortly pedunculate or sessile cymes.

The following is the only species which I have seen.

1. **L. daphnoides,** *Benth. l. c.* A perfectly glabrous shrub, attaining 12 ft.; extremities terete. Leaves petiolate, penniveined, rather coriaceous, oblong-elliptical, shortly acuminate, cuneate at the base, 3½–11 in. long, 1¾–4 in. broad; petiole ¼–½ in. Flowers ⅓–½ in. long, slender; pedicels equalling or slightly exceeding the calyx or flowers nearly sessile, collected in sessile or very shortly pedunculate, many-flowered, extra-axillary cymes. Calyx deeply 5-lobed, many times shorter than the corolla. Fruit more or less pointed, 1–1½ in. long, with the persistent unchanged calyx.

Upper Guinea. Bagroo and Kongui rivers, *Mann!*

The Kongui specimens have leaves three times as large as those of the Bagroo plant and the flowers subsessile, but I cannot distinguish them specifically.

12. **APODYTES,** E. Meyer; Benth. et Hook. f. Gen. Pl. i. 351.

Calyx small, 5-toothed or -partite. Petals 5, free, valvate, glabrous or nearly so. Stamens 5, alternate, free or very shortly adherent to the base of the petals; filaments usually compressed below, subulate or filiform above. Anthers linear to lanceolate-oblong. Ovary 1-celled; style more or less oblique; ovules 2, pendulous. Fruit crustaceous, obliquely ellipsoidal or rounded. "Seed pendulous, with a small embryo near the apex of a fleshy albumen."—Shrubs or trees. Leaves alternate, entire, penniveined. Flowers in terminal panicles or axillary fascicles (*Rhaphiostylis*, Planch.).

A small genus, confined to the tropics of the Old World.

Flowers in terminal panicles. Leaves broadly- or ovate-elliptical, obtuse or acute . . . . . 1. *A. dimidiata.*
Flowers in axillary fascicles. Leaves oblong or oval-oblong, acuminate 2. *A. beninensis.*

1. **A. dimidiata,** *E. Mey.; Benth. in Linn. Trans.* xviii. 684. *t.* 41. A tree of 15–30 ft. or more; extremities usually appressed-puberulous at first. Leaves petiolate, rather coriaceous, shining above, ovate-elliptical or broadly elliptical, obtuse acute or shortly and broadly cuspidate, rounded or broadly cuneate at base, entire, venation obscure, glabrous, 1½–3 in. long, ¾ to nearly 2 in. broad; petiole from ¼–1¼ in. Flowers 1½–2 lines long in bud, in terminal, loose or subthyrsiform, many-flowered panicles, exceeding or overtopped by the leaves, sessile or shortly pedicellate, from very minute obsolete bract-scales. Calyx very small, 5-fid; lobes deltoid. Anthers [illegible]r- or lanceolate-oblong. Ovary pubescent. Young fruit 1-sided, com[illegible]l, oblong-rotundate or obliquely rounded.—*A. acutifolia*, Hochst. in [illegible] Schimp. Abyss.

Lower Guinea. Huilla, Angola, *Dr. Welwitsch!*
Nile Land. Abyssinia, *Schimper!*

Also at the Cape. Nearly allied to *A. mauritiana*, Planch. mss. (*Icacina mauritiana*, Miers, Contr. Bot. i. 56).

2. **A. beninensis,** *Hook. f. Ic. Plant.* 778. A glabrous shrub with terete extremities. Leaves firmly membranous or coriaceous, elliptic-oblong, rather obtusely acuminate, narrowed to the cuneate or but slightly rounded base, entire, glabrous, midrib prominent beneath, subdistant lateral veins moderately so, reticulation faint, 3–6 in. long, 1–2¼ in. broad; petiole 1 2 lines. Flowers ¼–⅓ in. long, pedicellate, in 3–10-flowered axillary fascicles or exceptionally subsolitary; pedicels glabrous, shorter than or equalling the flowers. Calyx glabrous; lobes ovate-rotundate. Filaments compressed below, subulate or filiform above. Ovary glabrous.—*Rhaphiostylis beninensis*, Planch. in Fl. Nigrit. 259. *R. Heudelotii*, Planch.; Miers' Contrib. Bot. i. 60. t. 6.

Upper Guinea. Senegambia! Cape Palmas, *T. Vogel!*
Lower Guinea. Congo, *Smith!*

Var. β. (a distinct species?). Leaves oblong, acuminate. Pedicels very short, with the calyx pubescent-tomentose or flowers subsessile. Ovary hirsute.—Eppah, Niger, *Barter!* River Kongui, *Mann!*

The obliquity of the style is less marked in var. β, perhaps because of the hairy ovary.

13. ALSODEIOPSIS, Oliv.; Benth. et Hook. f. Gen. Pl. i. 996.

Calyx 5-partite; lobes lanceolate, acute. Petals 5, lanceolate, glabrous within, connate $\frac{1}{3}$–$\frac{1}{2}$ of their length from the base, valvate in æstivation. Stamens 5, free, alternate with the petals. Anthers elliptical or ovate-oblong, minutely apiculate. Ovary free, 1-celled, hirsute, narrowed into the style; stigma minute; ovules 2, pendulous. Fruit narrowly oblong, 1-celled, 1-seeded; pericarp thin, crustaceous, indehiscent. Seed exalbuminous, with a membranous closely adherent testa. Cotyledons connate nearly throughout, with an oblique lobe at the base connivent over the small ovoid superior radicle.—A shrub with strigillose-hirsute extremities. Leaves membranous or thinly coriaceous. Flowers very small, pedicellate, in short axillary cymes or subracemose.

Based upon the following species. The structure of the seed is very similar to that of *Sarcostigma.*

1. **A. Mannii,** *Oliv. in Journ. Linn. Soc.* x. 43. Leaves oblanceolate or oblanceolate-oblong, acuminate, narrowed to the usually obtuse, sometimes oblique base, entire, glabrous or thinly hispid-scaberulous above, the prominent midrib and lateral veins more or less hispid beneath or glabrescent, 3–9 in. long, $1\frac{1}{4}$–$2\frac{3}{4}$ in. broad; petiole 1–2 lines, strigillose or hairy. Inflorescence usually under 1 in. Petals at length recurved above, three to four times longer than the calyx. Fruit 1 in. long.—Hook. Ic. Pl. 1008.

Upper Guinea. Mount John, Kongui river, *Mann!*

Our specimens belong to two forms, but they do not appear to differ in any important character.

14. ICACINA, A. Juss.; Benth. et Hook. f. Gen. Pl. i. 352.

Calyx 5-toothed or -partite. Petals 5, valvate, usually hirsute or pubescent externally and bearded within (glabrous in *I. macrocarpa*). Stamens 5, alternate with the petals, free, often inserted beneath a small hypogynous disk. Anthers ovoid or oblong, dorsally affixed. Ovary 1-celled, usually narrowed into the style and more or less pilose or hirsute; stigma minute or slightly peltate-dilated; ovules 2 pendulous. Fruit indehiscent, 1-celled, 1-seeded; pericarp crustaceous or outer layer fleshy with a thin woody or bony putamen. Seed pendulous; embryo shorter than the fleshy uniform albumen, with thin foliaceous cotyledons and a short radicle.—Shrubs sometimes scrambling or scandent. Leaves alternate, entire, penniveined. Flowers in axillary or terminal panicles or glomerate in short simple or branched axillary spikes or racemes.

A small genus, confined to W. tropical Africa.

Flowers pedicellate, in corymbose cymes collected in a terminal panicle.
Petals barbate within . . . . . 1. *I. senegalensis.*

Flowers sessile, in irregularly branched, many-flowered, axillary panicles, 4–6 in. long and broad. Petals not bearded within. Leaves 6–10 in. . . . . 2. *I. macrocarpa.*
Flowers in axillary glomeruli or short racemes.
Calyx one-third length of the petals, 5-fid, with lanceolate lobes . . 3. *I. Mannii.*
Calyx nearly as long as the petals, 5-partite, with linear-subulate segments. Flowers densely silky-hirsute . . . . . 4. *I. trichantha.*

1. **I. senegalensis,** *A. Juss. in Mém. Soc. Hist. Nat. Paris,* i. 174. *t.* 9. Branches glabrous or thinly pubescent. Leaves rather coriaceous, elliptical, obtuse, sometimes broadly rounded or retuse, the upper occasionally rather acute, rounded at the base, entire, glabrous or midrib thinly pubescent beneath, 2½–4 in. long, 1½–2½ in. broad; petiole 1–3 lines or leaves subsessile. Flowers in pedunculate, ascending or erect, corymbose cymes collected into a terminal leafless panicle or the lower peduncles from the axils of reduced leaves, silky-hirsute externally; pedicels 0–¼ in. Calyx 5- (rarely 6-)fid; lobes triangular, acute, much shorter than the petals. Petals barbate within near the base. Ovary hirsute.

Upper Guinea. Senegambia! Gambia, *Skues!* Niger Expedition (without precise locality), *Barter!*

2. **I. macrocarpa,** *Oliv.* An extensive climber; extremities rigid, pubescent. Leaves ample, thinly coriaceous, oblong-elliptical, shortly and obtusely cuspidate or obtuse, broadly rounded at the base, entire, glabrous above, glabrescent beneath, midrib and lateral veins pubescent, with the reticulation prominent, 6–10 in. long, 3–4½ in. broad; petiole ¼–½ in. Flowers very small, numerous, sessile, in loosely branching (axillary?) rusty pubescent-tomentose panicles, 4–6 in. long and broad. Calyx cupuliform, broadly 5-toothed; teeth deltoid. Petals rather thick, glabrous within. Anthers oblong-elliptical. Ovary densely hirsute; style short, glabrous; stigma capitate. Drupe ovoid, 2–2½ in. long, 1½–2 in. in diam., with numerous shallow longitudinal furrows confused towards the apex and connected below by transverse depressions; pericarp about ¼ in. thick; inner layer thin, woody. Seed solitary, 1½–2 in. long, with a broad well-marked raphe. Embryo shorter than the albumen. Cotyledons thin, foliaceous; radicle superior, very short, obtuse; plumule conspicuous.

Upper Guinea. Fernando Po, *Mann!*

3. **I. Mannii,** *Oliv.* A shrub, attaining 8 ft. or sometimes scandent; extremities glabrous. Leaves membranous or thinly coriaceous, broadly oblong-elliptical or elliptical, shortly acuminate, more or less rounded at the base, entire, glabrous or midrib below and petiole obsoletely pubescent, midrib and subdistant lateral veins rather prominent, 4–6 in. long, 1¾–2¾ in. broad; petiole 1½–5 lines. Flowers appressed silky-hirsute, rather crowded in short, axillary, solitary or geminate racemes or fascicled and sessile; pedicels not exceeding 1 or 2 lines; bracts lanceolate, minute. Calyx deeply 5-fid, with lanceolate or ovate-lanceolate lobes, about one-third the length of the petals. Petals barbate within. Ovary tapering into the style, more or less hirsute. Fruit not seen.

Upper Guinea. Old Calabar, *Mann!*

4. **I. trichantha,** *Oliv.* Scandent. Extremities terete, rusty- or cinnamon-tomentose-pubescent. Leaves ample, membranous, oblong-elliptical or broadly elliptical, cuspidate or shortly acuminate, rounded, sometimes broadly, at the base, entire, glabrous above, glabrescent or the nerves thinly or appressed-hispid beneath, 6–9 in. long, 2–5 in. broad; petiole 1–3 lines or leaves subsessile. Flowers densely and rather softly silky-hirsute, crowded in very short simple or slightly branched racemes or spikes; pedicels very short or 0. Calyx 5-partite; segments linear-subulate, nearly or quite equalling the petals. Petals barbate within. Anthers ovate-oblong. Ovary hirsute, narrowed into the style. Fruit an ellipsoidal drupe, with a thin softly pubescent skin, about 1 in. long; endocarp very thin, bony, rather strongly 2-keeled and slightly reticulate. Seed solitary; embryo often oblique or transverse, shorter than the albumen, with thin foliaceous cotyledons. Testa thinly membranous.

Upper Guinea. Onitscha, Niger, *Barter!*

15. **IODES,** Blume; Benth. et Hook. f. Gen. Pl. i. 355.

Flowers diœcious, in cymose panicles. Perianth simple or double; if double, the outer minute, 4–5-fid, regular or irregular; if simple, or the inner if double, 4–5-fid, the lobes valvate in æstivation, sometimes unequal. Male fl.: Stamens as many as perianth-lobes and alternate with them; filaments very short or 0. Anthers 2-celled, dehiscing longitudinally, erect or dorsally recurved. Pistil rudimentary. Female fl.: Stamens 0 or rudimentary. Ovary sessile, usually strigose or hairy, 1-celled, with 2 pendulous ovules; stigma sessile, fleshy, disciform. The drupe is described as dry, 1-seeded. Embryo more than half as long as the fleshy albumen, with flat foliaceous cotyledons and a short superior radicle.—Scandent shrubs. Leaves opposite or subopposite, entire, membranous. Flowers small, usually in many-flowered pedunculate, irregularly-forking, cymose, axillary panicles, usually hairy or strigillose; the peduncles frequently reduced to cirrhi.

A small genus, confined to tropical and insular Asia and W. Africa. The African species has precisely the facies of the Indian ones, but its perianth is simple and the anthers are recurved and adnate. As, however, the outer perianth, in the Indian species, is probably involucral, I do not think a generic separation would be justifiable.

1. **I. africana,** *Welw. mss.* A weak climber, extending 15–20 ft. or further; extremities at first strigillose or shortly hirsute, at length sometimes glabrescent. Leaves membranous, rather large, elliptical or ovate-elliptical, usually shortly acuminate or cuspidate, broadly rounded subcordate or distinctly cordate and sometimes oblique at base, entire, at length glabrous or nearly so, excepting the usually strigillose midrib impressed above, 3–6 in. long, 1½–4 in. broad; petiole more or less strigillose, ⅛–1 in. Male panicles loosely forking from above or below the middle, equalling or exceeding the leaves, thinly strigillose. Perianth simple; lobes at length revolute. Anthers recurved and adnate over the apex of the short filament. Tendrils extra-axillary. Fruit not seen.

Upper Guinea. Old Calabar and Gaboon (male flowers), *Mann!*

Lower Guinea. Golungo Alto and Cazengo, Angola (female flowers), *Dr. Welwitsch!*

Phytocrene: Imperfect specimens of perhaps 2 species of this genus were sent home by Dr. Kirk from Sierra Leone and S. tropical Africa. They are insufficient for description.

Order XL. ILICINEÆ (by Prof. Oliver).

Flowers regular, hermaphrodite or subdiœcious. Calyx 3–6-toothed or -partite, usually persistent. Petals 3–6, free or connate below, hypogynous, imbricate. Stamens as many as the petals, alternate with them, free or adherent to the petals. Anthers rotundate or subcordate, dehiscing longitudinally. Ovary ovoid or globose, free, 3–6-celled; style terminal or 0. "Ovules 1 or 2 in each cell, pendulous. Fruit drupaceous, with 3 or more bony 1-seeded pyrenes. Seeds with a fleshy albumen; embryo minute, apical, with a superior radicle."—Trees or shrubs, usually glabrous and evergreen. Leaves alternate, exstipulate, petiolate, coriaceous, entire dentate or sinuous-spinose. Flowers small, in axillary cymes or umbels, often pedunculate.

A small Natural Order chiefly American and Asiatic, with a few outliers in the N. temperate zone. By far the greater number of species belong to the genus *Ilex*. The only tropical African representative appears to be peculiar to the continent.

1. ILEX, Linn.; Benth. et Hook. f. Gen. Pl. i. 356.

Petals usually connate at the base. Stamens as many as petals. Ovary 4–6-celled.—Trees or shrubs. Leaves usually shining. Inflorescence axillary.

A large genus widely dispersed in tropical and temperate regions, represented by the common Holly in Britain.

1. **I. capensis,** *Sond. and Harv. Fl. Capensis,* i. 473. A glabrous shrub or tree, attaining sometimes 30–40 ft. Leaves rather coriaceous, oblong-elliptical or oval, acute, mucronate, occasionally broadly acute or rather obtuse, more or less acute at the base, rather remotely serrulate or denticulate-serrate towards the apex or entire, 2½–4 in. long, ¾–1½ in. broad; petiole ¼–¾ in. Flowers in shortly pedunculate umbels, 5-merous or 6-merous. Petals connate below. Berries ovoid-globose, crowned by the sessile or subsessile obtuse stigma (in the Cape specimens).—For synonymy, see 'Flora Capensis.'

Upper Guinea. Camaroons mountain, 4000–8000 ft., *Mann!*
Lower Guinea. Angola, prov. Huilla, *Dr. Welwitsch!*
Also at the Cape.

Order XLI. CELASTRACEÆ (by Prof. Oliver).

Flowers small, regular, usually hermaphrodite. Calyx 4 5-lobed or -partite, persistent. Petals 4–5, usually spreading, sessile or subsessile around or below the margin of the disk, imbricate. Stamens as many as petals or

3, variously inserted upon, outside of, or within, the more or less conspicuous disk. Ovary sessile or rarely shortly raised on a thick columnar torus, free or more or less confluent with the disk, 3–5-celled; style entire or lobed; stigma simple or lobed. Ovules 2 (rarely 1) or ∞, anatropous, erect or ascending. Fruit a capsule, drupe, or subapocarpous and often samaroid. Seeds sometimes winged (*Hippocratea*), with or without a fleshy albumen, frequently arillate.—Shrubs or trees, occasionally spinescent or scandent. Leaves opposite or alternate, most frequently coriaceous, simple. Stipules minute or 0. Inflorescence cymose, axillary or terminal. Flowers small, greenish yellowish or white.

A considerable and wide-spread ligneous Order, most frequent in warm countries. One monotypic genus is confined to tropical Africa.

Stamens as many as petals.
- Ovules 2 in each cell.
  - Leaves alternate. Fruit a capsule . . . . . 1. CELASTRUS.
  - Leaves opposite. Fruit a capsule . . . . . 2. CATHA.
  - Leaves alternate (or opposite). Fruit a drupe . . . . . 3. ELÆODENDRON.
- Ovules 6–8 in each cell.
  - Leaves opposite. Anthers dehiscing transversely . . . . 4. CAMPYLOSTEMON.

Stamens (3) fewer than petals.
- Fruit of distinct usually dehiscent carpels . . . . . 5. HIPPOCRATEA.
- Fruit baccate, indehiscent . . . . . 6. SALACIA.

1. CELASTRUS, Linn.; Benth. et Hook. f. Gen. Pl. i. 364.

(*Gymnosporia*, Wight et Arn.; Benth. et Hook. f. l. c. 365.)

Flowers frequently polygamous. Calyx 5-partite or 5-fid. Petals 5, sessile, usually spreading. Stamens 5, inserted upon or under the margin of the disk; anthers dehiscing longitudinally. Ovary 2–3-(rarely 4-)celled, free or more or less confluent with the disk; style short; stigma with as many lobes as cells in the ovary or subcapitate. Ovules 2 in each cell. Capsule globose or obovoid, often trigonous, 3–2–1-celled, with 1 or 2 seeds to each cell, dehiscing loculicidally. Seeds with a fleshy albumen, frequently more or less invested by a fleshy arillus.—Shrubs or trees frequently armed with axillary spines. Leaves alternate, usually more or less coriaceous and serrulate or toothed. Flowers small, in (African species) axillary forking cymes or pedicels simple, fasciculate.

A large genus widely distributed in the warmer and tropical countries of the Old World. The tropical African species appear to be endemic with the exception of one wide-spread species, *C. senegalensis*. The species do not admit of being separated by decisive characters in an analytical table.

Peduncles forking. Armed or unarmed.
- Leaves acute, 3–6 in., elliptical, serrulate. Peduncles 1½–3½ in., slender. Ovary half-immersed . . . . . 1. *C. gracilipes*.
- Leaves acute (or the fasciculate leaves obtuse), oblanceolate or oblanceolate-rhomboid, much narrowed below, 2–3 in. Ovary free . . . . . 2. *C. andongensis*.
- Leaves more or less obtuse, rarely exceeding 3–4 in.
  - Leaves obovate-elliptical to oblanceolate, very obtuse, much narrowed below, glaucescent, serrulate or entire, ¾–4 in. Ovary usually 2-celled . . . . . 3. *C. senegalensis*.

Leaves elliptical (to oblanceolate), serrulate, 1½–3 in. Ovary 3-celled, on a fleshy disk	4. *C. serratus.*
Leaves membranous, ovate to elliptic, 1–3 in., denticulate. Ovary free, on raised disk	5. *C. euonymoides.*
Slender. Leaves ovate to lanceolate, base rounded, ¾–1½ in. Peduncles filiform, equalling or exceeding the leaves	6. *C. mossambicensis.*
Leaves elliptic-oblong, 1–1½ in. long, ½–½ in. broad. Peduncles glandular, equalling leaves	7. *C. Atkaio.*
Leaves very coriaceous, elliptic or obovate, ½–1½ in., very obtuse. Ovary free, on raised disk	8. *C. arbutifolius.*
Peduncles simple, usually fascicled. Unarmed.	
Leaves sinuate-serrate or -dentate, elliptical to oblanceolate, 1½–4 in., obtuse. Ovary immersed	9. *C. luteolus.*
Leaves serrulate, elliptical, acute, 3–6 in. Ovary half-immersed	10. *C. lancifolius.*
Leaves serrulate, oblong-oval, obtuse, 2½–5 in. Ovary nearly free	11. *C. laurifolius.*
Leaves equally serrate, oval, 1½–2 in. Ovary half-immersed	12. *C. huillensis.*

1. **C. gracilipes,** *Welw. mss.* A glabrous shrub or shrubby tree with purplish, often armed branches, spines slender, straight, leafless, varying to 3 in. Leaves rather large, distinctly petiolate, firmly membranous or rather coriaceous, oblong-elliptical or broadly oval, narrowed to each end, usually acute, occasionally shortly acuminate, serrulate, glabrous, 3–6 in. long, 1–3 in. broad; petiole ⅛–½ in. Peduncles very slender, forking usually above the middle a few times, 1½–3 in. long. Flowers small, white, often rather cymosely clustered. Ovary half-immersed in a fleshy adnate disk, 3-celled with a subsessile 3-fid stigma. Fruit after dehiscence ¾–1 in. in diam.

Upper Guinea. Ambas Bay, Gulf of Guinea, *Mann!*
Lower Guinea. Golungo Alto, Angola, *Dr. Welwitsch!*

2. **C. andongensis,** *Oliv.* A glabrous shrub of 3–5 ft. with or without axillary spines ¼–¾ in. in length. Leaves as in *C. senegalensis*, much narrowed, usually from above the middle, to the petiole, differing in their being usually acute or broadly pointed, though when fascicled from the axils of a previous year they may be very obtuse; they are serrulate above but not glaucous or glaucescent, 2–2¾ in. long, ½–1¼ in. broad; petiole gradually dilating into the lamina. Branching cymes much shorter than the leaves. Ovary free, 3-celled, with a short style equalling the spreading stigmas.

Lower Guinea. Pungo Andongo, Angola, *Dr. Welwitsch!*

3. **C. senegalensis,** *Lam.; DC. Prod.* ii. 8. A glabrous, usually glaucous glaucescent or pale green shrub, very variable in size and form of the leaves, from 1–10–15 ft. in height, unarmed or spinose; spines short and slender or stout and several inches long, often bearing leaves and flower-cymes towards the apex. Leaves coriaceous, obovate-elliptical or oblanceolate, usually very obtuse or even retuse, occasionally subacute and mucronate, much narrowed to the petiole, serrulate denticulate or nearly entire, ¾–4 in. long, ⅓–2 in. broad; petiole 1–2 lines to ½ in., usually dilating into the lamina. Cymes axillary, solitary or fascicled, usually shorter than the leaves, forking from or below the middle, loose and divaricate or rather compact. Ovary broad-based, surrounded by a fleshy disk, apparently normally 2-celled, occasionally 3-celled, in the ♀ with a 2-fid style with more or less clavate branches. Capsule subglobose or obovoid, usually 2-valved with

1 or more seeds.—*C. montanus*, Roxb. Fl. Ind. i. 620. *C. phyllacanthus*, L'Herit. Sert. 6. n. 28. *C. decolor*, Delile, Voy. à Méroë, 100. t. lxiv. 6. *C. coriaceus*, Guill. et Perr. Fl. Seneg. i. 142. *C.* (*Catha*, p. 725) *europæus*, Boiss. Voy. en Espagne, 127. t. 38. *C. obovatus*, Hochst. in Schimp. Pl. Abyss. *C. glaucus*, R. Br. in Salt, Abyss. App. 64. *Catha decolor* and *C. senegalensis*, Webb, Frag. Fl. Æthiop. 60–61.

Upper Guinea. Senegal, *Heudelot!* and others; Nigritania, *Barter!*
Nile Land. Sennar, *Kotschy!* Abyssinia, *Salt! Schimper!* and others; Kordofan, *Cienkowski;* Nubia (*Schweinf. et Asch. Enum.*).
Lower Guinea. Angola, *Dr. Welwitsch!*
Mozamb. Distr. Zambesi, *Dr. Kirk!*

Var. *pumila* (Welw. mss.). About 1 ft. high, unarmed. Pastures, Huilla, Angola, *Dr. Welwitsch!*

C. senegalensis occurs in the Mediterranean region and eastward to India.

4. **C. serratus,** *Hochst.; Rich. Fl. Abyss.* i. 131. Unarmed or spines inconspicuous. Extremities glabrous or puberulous. Leaves more or less coriaceous, ovate to elliptical or oblanceolate, obtuse or sometimes broadly acute, broadly rounded at the base or cuneate, acutely serrulate or crenulate, glabrous, reticulation often prominent beneath, 1½–3 in. long, ¾–1¾ in. broad; petiole 1–4 lines. Peduncles axillary, often fascicled, forking from the base, considerably shorter than the leaves, puberulous. Ovary broad-based, 3-(2-)celled, seated on a fleshy disk, scarcely or slightly immersed; stigma 3-lobed, subsessile or style very short. Capsule 3-valved, smooth.—*C. obscurus*, A. Rich. Fl. Abyss. i. 131–2. *C. pyrifolia*, ms. in Herb. Franqueville. *C. Schimperi* and *C. edulis*, Hochst. in Schimp. Pl. Abyss. *C. serrulatus*, R. Br. in Salt, Abyss. App. 64.

Nile Land. Abyssinia, *Salt! Schimper!* and others.

5. **C. euonymoides,** *Welw. mss.* A shrub of 3–8 ft., armed with slender straight axillary spines, often 2–2½ in. long, frequently bearing leaves and flowers near the extremity. Young branches purplish, puberulous. Leaves membranous, very shortly but distinctly petiolate, ovate passing into elliptical, subacutely or rather obtusely pointed, broadly cuneate or rounded at the base, obsoletely serrulate or obtusely denticulate, reticulation rather prominent when dry, minutely pubescent at least on the midrib beneath, at length glabrous, 1–3 in. long, ½–1⅝ in. broad; pubescent petiole ½–1 line. Cymes spreading, repeatedly forked, pubescent, in our specimens usually from the pair of leaves borne by the axillary spines. Ovary nearly wholly free, inserted upon a thick, raised, fleshy disk, 3-celled; style equalling or exceeding the ovary, 3-fid. Valves of fruit crimson, puberulous.

Lower Guinea. Golungo Alto and Zenza do Golungo, Angola, *Dr. Welwitsch!*

6. **C. mossambicensis,** *Klotzsch in Peters' Mossamb. Bot.* 112 (*ex descr.*). A small perfectly glabrous shrub; ultimate branchlets very slender. Leaves small, membranous, broadly ovate-lanceolate or ovate, more rarely ovate-cordate, obtuse, sometimes with a microscopic mucro, base not narrowed to the petiole, often more or less rounded, serrulate, ¾–1½ in. long, ⅓–¾ in. broad; petiole slender, 1–2 lines. Axillary peduncles filiform, slightly

exceeding or equalling the leaves, dichotomous, 1–4 or 5 from each axil, first fork often below the middle. Calyx 5-partite; segments rotundate. Ovary ovoid, inserted by a broad base in the centre of a fleshy disk more or less free at the margin, 3-celled. Style deeply 3-fid; lobes at length spreading or recurved and 2-fid (at least in the Natal plant). Fruit I have not seen.—*C. rubra* (Herb. Gerrard).

Mozamb. Distr. Rovuma river, *Drs. Kirk! and Meller!* Inhambane (*Klotzsch*). Also south of the tropic.

7. **C. Atkaio,** *Rich. Fl. Abyss.* i. 132. Armed; with terete pulverulent branches; spines long, straight, slender. Leaves coriaceous, shortly petiolate, elliptic-oblong, usually obtuse, crenate-dentate, glabrous, 1–1½ in. long, ¼–½ in. broad. Cymes axillary, divaricately forked from the base, equalling the leaves. Peduncles glandular.

Nile Land. Prov. Chon, Abyssinia, *Petit.*

I have not seen a specimen. The description is from Richard, who says the plant is near *C. buxifolius*, Linn.

8. **C. arbutifolius,** *Hochst.; Rich. Fl. Abyss.* i. 133. A stiff, much-branched, usually spinose shrub. Extremities glabrous or puberulous. Spines straight, ⅓–1 in. Leaves small, very coriaceous, elliptical or obovate-elliptical, very obtuse or even emarginate, rounded or cuneate at the base, obsoletely serrulate or subentire, glabrous, ⅓–1¼ in. long, ¼–¾ in. broad; petiole usually distinct, 1–2 lines. Peduncles axillary, usually 2 or 3 from the same axil, ¼–¾ in., bearing a few-flowered, often umbellate cyme of shortly pedicellate flowers. Ovary nearly quite free, raised upon a fleshy disk, 3-celled; style with 3 spreading or recurved linear lobes. Capsules size of a large pea, usually 3-valved.—*C. parviflorus*, Ferr. et Galin. Voy. Abyss. Atlas Bot. t. 5.

Nile Land. Abyssinia, *Schimper! Dr. Roth!*

Messrs. Ferret and Galinier (Voy. Abyss. iii. 107) identify this plant with *Celastrus parviflorus*, Vahl (*Catha spinosa*, Forsk.). They may be correct, but as Forskål describes the capsule as 2-locular, I prefer to leave it under Hochstetter's name at present.

9. **C. luteolus,** *Delile in Ann. Sc. Nat. Ser.* 2. xx. 90. A glabrous shrub, unarmed in our specimens. Leaves very coriaceous, pale green, ovate-elliptical or varying from oval to oblanceolate, subacute or obtuse, more or less cuneate at base, usually coarsely dentate-serrate or sinuate-dentate, with obtuse or acute teeth, glabrous, 1½–4 in. long, ¾–1½ in. broad, occasionally smaller; petiole 1–3 lines. Pedicels simple, in axillary 2–6–8-flowered fascicles, articulated near the base, in fruit 2–4 lines long. Ovary broad-based, ½-immersed in a fleshy disk, 3-celled. Stigma 3-lobulate. Capsule smooth, the size of a pea.—Ferr. et Galin. Voy. Abyss. Atlas Bot. t. 8.—*C. sinuato-dentatus*, Hochst. in Pl. Schimp. Abyss.

Nile Land. Abyssinia, *Schimper!*

Mozamb. Distr. ? Zanzibar, *Dr. Kirk!* In fruit only. Perhaps distinct.

I follow Richard, who is probably right, in his identification of Delile's plant. A specimen in fruit of, apparently, an allied plant collected at Cape Coast (*Brass*) is in the herbarium of the British Museum.

10. **C. lancifolius,** *Schum. et Thonn. Pl. Guin.* 132 (*ex descr.*) A small unarmed tree of 7–10 ft., with green, terete, glabrous or glabrescent branches, and a sharp decurrent line on each side from the petiole. Leaves thinly coriaceous, shortly but distinctly petiolate, elliptical or ovate-elliptical, acute, often shortly acuminate, rounded or broadly cuneate at the base, serrulate or nearly entire, glabrous, 3–6 in. long, 1½–2¾ in. broad; petiole 1–3 lines. Flowers small, white, in axillary many-flowered fascicles, but little exceeding the petioles; pedicels 2–3 lines, 1-flowered. Ovary 3-celled, half-immersed, surrounded by a fleshy disk. Stigma subsessile, 3-sulcate. Fruit crimson, obtusely trigonous. Seeds solitary in each cell, half-immersed in a whitish arillus.

Upper Guinea. Adah, Guinea, *Thonning.*
Lower Guinea. Golungo Alto, Angola, *Dr. Welwitsch!*
Celastrus macrophyllus, of Dr. Welwitsch's mss.

11. **C. laurifolius,** *Rich. Fl. Abyss.* i. 130 (*ex descr.*). A small tree or shrub, with pale green, glabrous, unarmed branches. Leaves very coriaceous, oblong-lanceolate or oval, obtuse or scarcely acute, more or less narrowed to the petiole, obtusely dentate-serrate, glabrous, paler or glaucescent beneath, reticulation not conspicuous, pale green when dry, 2½–5 in. long, ¾–1¾ in. broad; petiole 2–3 lines. Flowers in rather dense, many-flowered, axillary fascicles; pedicels simple, 1–2 lines. Ovary nearly free, surrounded by a broad disk. Capsule glabrous, size of a pea, 3-valved.

Nile Land. Abyssinia, *Dillon; Captain Pullen!*
Var. β. ? Leaves dark brown when dry, paler beneath, serrulate. Pedicels pubescent.
Mozamb. Distr. Lake Nyassa, *Dr. Kirk!*

12. **C. huillensis,** *Welw. mss.* A small, much-branched, glabrous, evergreen, unarmed tree. Extremities pale green. Leaves coriaceous, oval, narrowed to each end, obtuse, rather finely and equally serrate, glabrous, 1½–2 in. long, ½–1 in. broad; petiole 1–2 lines. Flowers greenish, polygamous, axillary, solitary or in fascicles of 2 5; pedicels 2–3 lines. Ovary half-immersed in the disk. Capsule glabrous, 3-valved.

Lower Guinea. Huilla, Angola, *Dr. Welwitsch!*

Celastrus multiflorus, *Lam. Dict.* i. 661, given as a doubtful African species, I do not know. It may be a Cape species. It is described with branches 'horriblement hérissés' with spines and numerous lateral pedunculate umbelliform cymes of white flowers.

2. CATHA, Forsk.; Benth. et Hook. f. Gen. Pl. i. 361.

Calyx 5-lobed, small. Petals 5. Stamens 5, inserted on the outer margin of a thin notched disk. Ovary free, surrounded by the disk, 3-celled; style very short, 3-fid, with spreading or recurved stigmatose lobes. Ovules 2 in each cell, ascending. Capsule oblong or clavate-oblong, dehiscing from above loculicidally in 3 valves, 1–3-seeded.—A glabrous shrub. Leaves opposite, or alternate on the leafy shoots, coriaceous. Flowers in short axillary cymes.

Based upon the following species, which is confined to Eastern Africa and the adjacent parts of Asia.

1. **C. edulis**, *Forsk. Fl. Æg. Arab.* 63. Leaves narrowly oval oblanceolate or elliptical, rather obtusely pointed, narrowed into the petiole, serrate, 2–4 in. long, ½–1½ in. broad. Petiole ¼ in. more or less. Cymes ½–3 in. Capsule about ½ in. long.—*Celastrus edulis*, Vahl; DC. Prod. ii. 6; Ferr. et Galin. Voy. Abyss. Bot. Atlas. t. 4. *Catha Forskalii*, Rich. Fl. Abyss. i. 134. t. 30. *Trigonotheca serrata*, Hochst. in Flora, 1841, 662.

Nile Land. Abyssinia! *various collectors.*

I have not seen indigenous Arabian specimens. Cultivated apparently to a considerable extent.

3. **ELÆODENDRON**, Jacq. f.; Benth. et Hook. f. Gen. Pl. i. 367.

Flowers polygamous or hermaphrodite. Calyx 5–(4)-partite. Petals 5–(4), spreading. Stamens as many as petals, inserted under the margin of the disk; filaments subulate. Anthers rotundate, dehiscing longitudinally. Ovary more or less deeply immersed and confluent with the disk, 3–2-celled. Style very short; ovules 2 in each cell. Drupe dry (or pulpy), usually 1-celled, 1-seeded.—Shrubs or small trees, glabrous or pubescent, unarmed. Leaves persistent, alternate in the tropical African species, coriaceous, serrulate or entire. Flowers in axillary pedunculate cymes or umbels, small, yellowish greenish or white..

A considerable genus of tropical Asia and the Cape, extending eastward to Australia.

1. **E. æthiopicum**, *Oliv.*. A small tree or shrub. Extremities terete, closely and minutely pubescent or glabrous. Leaves more or less coriaceous, elliptical oblong- or ovate-elliptical, obtuse, entire or slightly emarginate, denticulate-serrate (the teeth at first glandular) or subentire, more or less shining and usually glabrous above, paler and glabrous or softly and minutely pubescent beneath, 1–2½ in. long, ½–1¼ in. broad, rarely larger; petiole glabrous or pubescent, 1½–2 lines. Flowers greenish-yellow, in axillary, often pubescent, subsessile umbels or on peduncles but little exceeding the petiole, 8–1-flowered; pedicels equalling or exceeding the flower. Calyx-lobes rotundate, usually pubescent. Petals obovate-rotundate, widely spreading. Ovary deeply immersed in the broad angular disk, 3- or 2-celled. Fruit ovoid, apiculate, ¼–⅓ in.—*Cassine æthiopica*, Thunb.; DC. Prod. ii. 12. *Mystroxylon confertiflorum*, Tul.; Harv. et Sond. Fl. Cap. i. 469.

Lower Guinea. Loanda, Angola, *Dr. Welwitsch!*
Mozamb. Distr. E. tropical Africa, lat. 6° 38′ S., *Speke and Grant!*

Var. *pubescens* (*E. Burkeanum*, Sonder, Fl. Cap. i. 470). Under surface of the leaves softly pubescent.—Bumbo and Huilla, Angola, *Dr. Welwitsch!*

Both forms occur south of the tropic.

For synonymy (which I have not verified) see Dr. Sonder in 'Flora Capensis.'

4. **CAMPYLOSTEMON**, Welw.; Benth. et Hook. f. Gen. Pl. i. 998.

Calyx 5-partite; lobes rotundate. Petals elliptical or broadly oblong,

spreading. Stamens 5, inserted in a minute inconspicuous disk around the ovary; filaments incurved; anthers introrse, dehiscing transversely, 4-celled. Ovary broad-based, free, 3-celled; stigma 3-fid, sessile; ovules 6–8 in each cell, 2-seriate. Fruit not seen.—A glabrous climbing shrub. Leaves opposite, membranous, elliptic-oblong, acuminate, serrulate. Flowers small, sulphur-yellow, in axillary cymes much shorter than the leaves.

A monotypic genus, confined to Angola.

1. **C. angolense,** *Welw.; Oliv. in Journ. Linn. Soc.* x. 44. Leaves 2–3½ in. long, ¾–1¼ broad, usually elliptic-oblong or oval, occasionally ovate-lanceolate; petiole slender, ¼ in. Cymes many-flowered, under 1 in. Flowers about 2½ lines in diam.

Lower Guinea. Prov. Cazengo, Angola, *Dr. Welwitsch!*

5. HIPPOCRATEA, Linn.; Benth. et Hook. f. Gen. Pl. i. 369.

Flowers hermaphrodite. Sepals 5. Petals 5, exceeding the sepals, erect or spreading, imbricate or valvate. Stamens 3; filaments recurved or reflexed at the tip, usually dilated around the ovary below or concealed in lateral notches of the ovary. Anthers various, from quadrate to transversely elongate-oblong, extrorse, rarely subsessile. Ovary surrounded by or raised upon a disk, 3-celled; style very short or subulate or 0; stigma terminal 3-lobulate or subentire, or stigmatic lobes 3, under the margin of the ovary; ovules 2–10 in each cell, 2-seriate. Fruit-carpels 3, distinct, flat, rarely nearly cylindrical, coriaceous, usually dehiscing along the median line. Seed compressed, usually dilated into a broad wing below, "exalbuminous; cotyledons flat, connate; radicle very short, inferior."—Usually climbing shrubs or trees. Leaves opposite, entire or serrate. Flowers in axillary cymes or more rarely terminal cymose panicles, usually small.

A large tropical genus, occurring in both hemispheres. At least two of the African species are common to tropical Asia.

Ovules 2 in each cell of the ovary.
- Anthers nearly concealed under lateral stigmatic notches in the side of the broadly convex apex of the ovary . . . . . 1. *H. pallens.*
- Anthers conspicuous. Stigma terminal.
  - Outer sepals distinctly smaller. Peduncles solitary, axillary, elongate; pedicels in an umbelliform cyme . . . . . 2. *H.? longipes.*
  - Sepals equal or nearly so.
    - Ovary raised above the broad disk on a distinct stipes as long as itself . . . . . 3. *H. Welwitschii.*
    - Ovary sessile or nearly so.
      - Sepals and petals rotundate. Disk cupuliform. Leaves small (1–2 in.) . . . . . 4. *H. parvifolia.*
      - Petals lanceolate or oblong, sides usually infolded . . . 5. *H. indica.*

Ovules 4–8.
- Petals valvate in æstivation.
  - Cymes and young shoots rusty-tomentose. Petals 1–2½ lines. Ovary sessile . . . . . 6. *H. apocynoides.*
  - Extremities glabrous. Cymes puberulous. Petals ¼ in. Ovary on short thick gynophore . . . . . 7. *H. apiculata.*

Glabrous. Flowers hoary, minute (1 line or less), in large terminal panicles . . . . . 8. *H. myriantha.*
Petals slightly (not broadly) imbricate, lanceolate or ovate-lanceolate.
Wholly glabrous or cymes puberulous. Petals 2½–3 lines. Leaves 1½–4 in. . . . . 9. *H. obtusifolia.*
Shoots rusty-pubescent. Ovary hairy. Petals 1½ lines. Leaves ¾–1¼ in. . . . . 10. *H. Kirkii.*
Petals much imbricate, broadly elliptical obovate or orbicular.
Petals fimbriate, unguiculate. Branches and inflorescence rusty-tomentose . . . . . 11. *H. velutina.*
Petals entire.
Petals ½ in., obovate, with much incurved sides. (Cymes very lax, 5–6 in.) . . . . . 12. *H. macrophylla.*
Petals 1 line or less.
Pedicels ¼ in. Leaves elliptical, 2–4 in. (drying black) . 13. *H. graciliflora.*
Pedicels about 1 line.
Leaves 3–7 in., elliptical, rounded below . . . . . 14. *H. paniculata.*
Leaves elliptic-lanceolate, 1½–2 in.; petiole ⅛–⅓ in. Filaments linear. . . . . 15. *H. andongensis.*
Leaves elliptic-lanceolate, 1–3 in.; petiole ⅛–¾ in. Filaments very short, much dilated . . . . . 16. *H. longipetiolata.*

1. **H. pallens,** *Planch. mss. in Herb. Kew.* Wholly glabrous. Leaves thinly coriaceous, elliptical to oblong-elliptical, shortly and obtusely pointed or acuminate, cuneate, sometimes broadly, at the base, entire or obscurely serrulate towards the apex, reticulation obscure, 1½–4 in. long, ½–2¼ in. broad; petiole ¼–½ in. Flowers small, in axillary, many-flowered, shortly pedunculate, forking, sometimes rather dense and rounded cymes, much shorter than the leaves (½–1½ in.). Sepals minute, ovate or obovate-oblong, imbricate in æstivation. Anthers almost concealed in lateral notches under minute stigmatic prominences on the margin of the broadly convex top of the ovary. Ovules geminate. Fruit not seen.

Upper Guinea. Sierra Leone, *Barter!* Bagroo river, *Mann!*
Lower Guinea. Cazengo, Angola, *Dr. Welwitsch!*
A small-leaved variety is in the Kew herbarium from Senegambia.

2. **H.? longipes,** *Oliv.* Wholly glabrous. Leaves subsessile, firmly membranous, oblong-elliptical or elongate-oval, obtusely often narrowly acuminate, narrowed to the base where the margins slightly fold and almost meet over the base of the midrib, obsoletely or undulate-serrulate or entire, midrib and looping lateral somewhat transverse veins prominent above; 5–8 in. long, 1½–2½ in. broad; petiole 1–2 lines or less. Peduncles axillary, solitary, slender, and unbranched to 2–4 in., then cymosely dividing into a subumbelliform head of very short scaly peduncles of 1–2 lines, from which spring the slender pedicels of ¼–½ in. Sepals rotundate, the outer smaller. Petals broadly elliptical or rotundate, broadly imbricate in bud. Filaments inserted between the broad fleshy disk and conical free ovary. Ovules in pairs. Fruit not seen.

Upper Guinea. Sierra d. Crystal, *Mann!*

3. **H. Welwitschii,** *Oliv.* A strong and extensive climber, wholly

glabrous. Leaves submembranous or at length coriaceous, broadly elliptical or obovate-elliptical, rather obtusely cuspidate or shortly acuminate, base broadly cuneate to rounded, obscurely- or undulate-serrulate at least towards the apex, reticulation scarcely prominent, 2–4 in. long, 1½–2½ in. broad; petiole ⅓–½ in. long. Flowers greenish, in many-flowered, forking, rather stout, axillary cymes from half as long to equalling the leaves; bracteoles minute, ovate, acute. Sepals rotundate. Petals oblong-elliptical, obtuse, imbricate. Gynophore narrower than the ovary, from the centre of a flattish saucer-like disk. Filaments subulate; anthers roundish, peltate after dehiscence. Ovules 2 in each cell of the ovary. Fruit-capsules oblong or oval-oblong, obtuse or broadly acute, about 2 in. long, ⅔–¾ in. broad.

Lower Guinea. Prov. Golungo Alto, Angola, *Dr. Welwitsch!*

4. **H. parvifolia,** *Oliv.* Wholly glabrous. Leaves rather small, coriaceous, shortly petiolate or subsessile, oblong-elliptical, passing from ovate-elliptical in the larger-leaved forms to narrow-oval-oblong in the smaller, acute or subacute, and, except in the narrow-leaved form, rounded sometimes broadly at the base, obscurely serrate or entire, shining and reticulate above, 1–2 in. long, ¼–1 in. broad; petiole ½–1½ lines. Flowers small, greenish-white, similar to those of *H. andongensis,* in rather few-flowered, axillary, pedunculate cymes, shorter than or equalling the leaves, singly subsessile or pedicels very short. Sepals and petals roundish, imbricate. Stamens inserted within a rather deep cupulate disk. Ovules 2 in each cell of the ovary. Fruit obovate-oblong, entire, very obtuse, 1¼–1½ in.

Lower Guinea. Prov. Huilla, Angola, *Dr. Welwitsch!*

5. **H. indica,** *Willd.; DC. Prod.* i. 568. A glabrous climber, the extremities often subquadrangular. Leaves firmly membranous or thinly coriaceous, elliptical or ovate-elliptical, shortly subacutely or obtusely acuminate, broadly cuneate or rounded, more rarely much narrowed at the base, finely serrulate or subentire, 2–3½(–4½) in. long, ⅝–2 in. broad; petiole ¼–½ in. Flowers small, very numerous, in axillary dichotomous cymes or cymose panicles, equalling or exceeding the leaves or together forming a lax leafy or leafless terminal panicle. Pedicels shorter than or scarcely exceeding the flower. Sepals minute, ovate to lanceolate. Petals lanceolate or oblong-lanceolate, scarcely acute; margins usually more or less infolded. Disk annulate, inconspicuous. Ovules 2 in each cell of the ovary. Fruit-carpels oblong, glabrous, obtuse or retuse, 1¼–1½ in. long, 5–6 lines broad.

Upper Guinea. Nupe, *Barter!* Fernando Po, *Mann!*
Lower Guinea. Pungo Andongo, and Golungo Alto, *Dr. Welwitsch!*

Var. β. Leaves much narrowed into the petiole.

Mozamb. Distr. Rovuma river, *Dr. Kirk!*

If rightly identified, the Angolan plant is an outlier of a species widely spread in continental and insular India.

We have an imperfect specimen of a climber allied to *H. indica,* but probably distinct, with obtusely apiculate, broadly crenate-serrulate leaves and a broad disk adnate to the base of the petals, from Sierra Leone (*Barter*).

6. **H. apocynoides,** *Welw. mss.* Climber with, at least, rusty-tomen-

tose or -pubescent extremities. Leaves firmly membranous or coriaceous, elliptical varying to obovate- or oblong-elliptical, very obtuse or shortly and obtusely pointed, base obtuse often broadly rounded more rarely cuneate, entire obscurely serrulate above or undulate, early glabrous or thinly pubescent beneath, sometimes on the midrib only, margin often narrowly rusty-pubescent, 2–4(–6) in. long, 1–2½ in. broad; petiole tomentose or glabrate, ⅛–¼ in. Flowers in rusty-tomentose, usually many-flowered, axillary cymes shorter than or equalling the leaves, very shortly pedicellate, externally rusty-hairy; bracteoles subulate. Sepals ovate or lanceolate. Petals ovate-lanceolate or -subulate, rather fleshy, valvate. Disk annular, inconspicuous. Filaments very short, broad and dilated around the ovary; apex recurved. Fruit-carpels 1½–2 in., elliptic-oblong, retuse or obtuse, entire.

Upper Guinea. Mouth of the Niger, *Mann!* (few-flowered form) Camaroons river, *Mann!*

Lower Guinea. Prov. Golungo Alto and Cazengo, Angola, *Dr. Welwitsch!*

7. **H. apiculata,** *Welw. mss.* Climber with glabrous extremities. Leaves coriaceous (thinly on flowering shoots), more or less broadly elliptical or obovate-elliptical with an abrupt, very short, and scarcely acute acumen or apiculus, occasionally rounded above, broadly cuneate or rounded at the base, entire, glabrous, reticulation subprominent beneath, 3–4½(–6) in. long, 1½–2½(–4) in. broad; petiole ¼–½ in. Flowers greenish, rather large, ¼ in. long at expansion, in many-flowered, axillary, pedunculate, divaricate cymes equalling the leaves or, at the extremities, forming leafless panicles of 4–6 in. Peduncles often unbranched to 1½–2 in., ultimate branches and flowers puberulous; bracts minute, ovate, acute. Calyx-lobes triangular. Petals linear-lanceolate, puberulous on both sides, ¼ in. long, valvate. Ovary raised upon a short thick gynophore and closely invested by the broadly dilated bases of the filaments. A minute annular disk surrounds the base of the gynophore. Ripe fruit not seen.

Lower Guinea. Prov. Golungo Alto, Angola, *Dr. Welwitsch!*

8. **H. myriantha,** *Oliv.* A glabrous climber. Leaves coriaceous, from obovate-cuneate broadly rounded or subtruncate above with or without a short broad obtuse apiculus to elliptical broadly and obtusely pointed, cuneate at base, obscurely undulate-crenate or entire, glabrous, 2½–4½ in. long, 1½–2¾ in. broad; petiole ½ in. more or less. Flowers minute, extremely numerous, in broad, terminal, cymose panicles or axillary pedunculate cymes collected towards the extremities or exceeding the leaves. Flowers and pedicels hoary-puberulous. Calyx-lobes minute, triangular. Petals oblong, valvate. Anthers puberulous. Ovary 3-lobed, with 5–6 ovules in each cell. Stigma subsessile. Fruit not seen.

Upper Guinea. Num river and Brass, *Barter!* Bagroo river, Old Calabar, and Kongui river, *Mann!*

The flowers and pedicels apparently abound in spiral vessels with a tenacious unrollable fibre.

9. **H. obtusifolia,** *Roxb.*; *DC. Prod.* i. 569. A glabrous climber. Leaves coriaceous, elliptical to oval-oblong, broadly rounded at the apex or

narrowed to an obtuse point, usually obtuse and rounded or broadly cuneate at the base, more rarely subcordate, minutely or obsoletely serrulate, reticulation subprominent, 1½–4 in. long, ¾–2 in. broad; petiole ¼–½ in. Flowers 5–6 lines in diam., in loose, many- or few-flowered, axillary, puberulous cymes shorter than or rarely equalling the leaves, or sometimes on pendent subcirrhose branches forming a loose panicle interrupted by long internodes and reduced leaves. Sepals ovate or ovate-rotundate. Petals much exceeding the sepals, ovate-lanceolate or lanceolate, rather obtuse, glabrous within, slightly imbricate. Ovary slightly raised upon a short thick disk, narrowed into a subulate style, obovate- or oblanceolate-oblong, much compressed, 2–2½ in. long. Fruit-carpels much compressed, oblong-oblanceolate or obovate, retuse or emarginate.—*H. Richardiana*, Camb.; Guill. et Perr. Fl. Seneg. i. 112. t. 26. *H. Schimperiana*, Hochst. and Steud. in Rich. Fl. Abyss. i. 99. t. 22.

Upper Guinea. Nupe, Niger, *Barter!*
Nile Land. Abyssinia, *Schimper! Capt. Pullen!* Senegal, *Perrottet!*
Lower Guinea. Bumbo and Loanda, Angola, *Dr. Welwitsch!*
Also in India.

10. **H. Kirkii,** *Oliv.* Extremities terete, rusty tomentose-pubescent, spreading nearly at right angles. Leaves small, rather coriaceous and shining above, rather coarsely and strongly reticulate beneath when dry, elliptical (often narrowly), obtuse cuneate or scarcely rounded at the base, obscurely serrulate, more or less pubescent on the midrib above and beneath, at least at first, ¾–1¼ in. long, ⅓–¾ in. broad; petiole pubescent, 1–1½ lines. Axillary cymes shorter than the leaves, pubescent; patent peduncles ¼–⅓ in. Flowers ¼ in. in diam. Calyx-lobes ovate, pubescent, equal. Petals spreading, ovate-lanceolate, acute, imbricate. Filaments distinct, recurved. Disk cupuliform with a prominent margin. Ovary hairy. Fruit-carpels obovate-oblong, compressed, very obtuse.

Mozamb. Distr. Zambesi, *Dr. Kirk!*

11. **H. velutina,** *Afzelius; DC. Prod.* i. 568. A climber, attaining 50 ft. Branches shortly rusty-tomentose. Leaves elliptical or from oblong- to rotundate-elliptical, broadly and shortly pointed obtuse or even broadly rounded at the apex, base rounded or in the broad-leaved form sometimes subcordate, entire, margin very narrowly revolute when dry, glabrous above excepting on the rusty-hispid midrib, with scattered often substellate scabrid hairs beneath especially on the principal veins, the rest at length glabrate, 2–4 in. long, 1½–1¾ in. broad; hairy petiole ¼ in. Inflorescence rusty-pubescent with divaricate peduncles, from the axils of and exceeding the upper leaves or collected in a lax terminal panicle; bracts oblong-lanceolate, near ¼ in. Flowers rather large, about ½ in. in diam., pedicellate. Calyx deeply 5-fid with ovate or oblong lobes. Petals rotundate, fimbriate at least below, unguiculate. Outer disk dentate, adnate to the base of the petals. Ovary densely hirsute. Fruit-carpels 1½–2 in. long, thick or subterete, obtuse, closely hispid-tomentose with a short rusty felt.

Upper Guinea. Sierra Leone, *Afzelius!* Kongui, *Mann!* Gaboon, *Mann!*

12. **H. macrophylla,** *Vahl; DC. Prod.* i. 568. A glabrous shrub. Leaves rather large, more or less coriaceous, broadly elliptical, shortly and acutely apiculate, more or less broadly rounded at the base, obscurely undulate-crenate or subentire, glabrous, principal lateral veins prominent beneath, 5–9 in. long, 2½–4½ in. broad; petiole ½–¾ in. Cymes very laxly forking, 5–6 in. long, with straight rather slender internodes. Flowers large; pedicel of central flower of each fork ½–¾ in. Calyx-lobes broadly rotundate. Petals 3–5 lines long, thin, broadly obovate, with the sides much incurved at flowering. Disk broad, with a free margin clothing the base of the calyx. Anthers broadly transverse-oblong. Ovary half-immersed. Fruit not known.—*H. rotundifolia*, Hook. f. Fl. Nigrit. 279.

Upper Guinea. Sierra Leone, *Smeathmann! Barter! Dr. Kirk!* Old Calabar and Gaboon, *Mann!*

This plant appears very nearly allied to a tropical American species (*Cuerva*, Triana's mss.; *Hippocratea malpighifolia*, Rudge; DC. Prod. i. 568), but in the absence of fruit I cannot safely identify them.

13. **H. graciliflora,** *Welw. mss.* An extensive climber, wholly glabrous. Leaves membranous, turning black on drying, elliptical to oblong-elliptical, subacutely or rather obtusely acuminate, cuneate at base, serrulate, 2–4 in. long, 1–1½ in. broad; petiole ¼–½ in. Flowers greenish, in lax, widely-divaricating, slender, axillary cymes, equalling or but little shorter than the leaves; pedicels ¼ in. more or less. Bracteoles very minute, triangular-subulate. Sepals half-orbicular. Petals spreading, rotundate, obsoletely unguiculate. Anthers much elongated transversely, forming an apparently sessile triangular enclosure around the obtuse subsessile stigma. Filaments very short and much dilated, closely investing the ovary. Ovules apparently about 6 in each cell. Fruit unknown.

Lower Guinea. Prov. Golungo Alto, Angola, *Dr. Welwitsch!*

14. **H. paniculata,** *Vahl; Guill. et Perr. Fl. Seneg.* i. 111. *t.* 25. A glabrous climber. Leaves thinly coriaceous, rather large, elliptical or oblong-lanceolate, shortly obtusely or subacutely pointed, more or less rounded at base, rather distantly crenate-serrulate, glabrous, 3–7 in. long, 2–4½ in. broad; petiole about ½ in. Flowers very small, whitish, in many-flowered, glabrous, axillary cymes, equalling or shorter than the leaves, which are sometimes panicled towards the ends of the branches, singly subsessile or pedicels equalling the flowers. Sepals roundish-ovate. Petals broadly oblong or orbicular, "ciliolate," imbricate in æstivation. "Anthers depressed-rotundate, unilocular, dehiscing transversely." Ovules 5–6 in each cell of the sessile ovary. "Fruit-carpels narrowed to the base, 4–6-seeded."

Upper Guinea. Senegambia, *Perrottet!* Sierra Leone, *Smeathmann!* (? Nigritania, *Barter!*)

I have not seen an authentic specimen of this plant. Were it not that the petals of Barter's plant are glabrous, I should not have hesitated to identify it with *H. paniculata*, as described in the 'Flora Senegambiæ.'

15. **H. andongensis,** *Welw. mss.* A slender climber, wholly glabrous. Leaves firmly membranous, elliptic-lanceolate, rather obtusely acuminate,

slightly rounded at base, serrulate, 1½–2 in. long, ¾–1 in. broad; petiole 1½–2 lines. Flowers yellowish, in axillary, shortly pedunculate, few-flowered cymes of ½ in. or less; pedicels equalling or shorter than the flower. Sepals rotundate. Petals spreading, broadly elliptical or obovate, very obtuse. Stamens inserted within a rather loose cup-shaped disk. Filaments linear, recurved. Fruit not seen.

Lower Guinea. Prov. Pungo Andongo, Angola, *Dr. Welwitsch!*

16. **H. longipetiolata,** *Oliv.* Wholly glabrous. Leaves rather coriaceous, lanceolate or elliptic-lanceolate, usually obtusely pointed or shortly acuminate, narrowed below into the long petiole, serrulate or serrate, nearly entire towards the base, with 3–5 principal lateral veins directed forward on each side the midrib; lamina 1–3 in. long, ½–1¼ in. broad; petiole ⅓–¾ in.; the lowest pair of the lateral shoots occasionally linear, ¼ in. broad. Flowers in axillary divaricately dichotomous cymes shorter than the leaves; bracts minute, ovate, acute. Petals broadly- or obovate-elliptical, broadly imbricate. Filaments short, much dilated below almost from the recurved anther, extending but little above the glabrous ovary around which they are closely connivent. Fruit-carpels coriaceous, obovate to obovate-lanceolate, obtuse, 2–2½ in. long, ¾–1¼ in. broad.

Mozamb. Distr. Zambesi, *Dr. Kirk!*

6. SALACIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 370.

Flowers hermaphrodite. Sepals 5. Petals 5. Stamens 3. Anthers variously 2-celled or -lobed; cells distinct or confluent, or 1-celled (4-locellate). Filaments usually inserted within or upon a disk. Ovary 3-celled; style very short or subulate; stigma terminal; ovules 2 or more in each cell. Fruit baccate, undivided, 1–3-celled, 1- or several-seeded.—Shrubs or small trees, sometimes scandent, glabrous. Leaves opposite or subopposite, coriaceous, subentire or serrulate. Flowers small, usually in axillary sessile or very shortly pedunculate fascicles.

Another large tropical genus, common to both hemispheres. I have not identified any of the African species with either Indian or American forms, unless it be *S. prinoides*. The species are difficult to discriminate, and the following key is but a very imperfect aid to their identification. Several are known from very imperfect material.

Anthers 2-lobed; lobes distinct or convergent and sometimes confluent above.

- Leaves elliptical, subentire. Flowers in cymes of ½–¾ in. Petals narrow-oblong. Filaments subulate, on thick disk . . . . . 1. *S. lucida.*
- Extremities with raised lines. Leaves elliptical, serrulate. Flowers numerous, 1 line or less in bud, in pedunculate cymes . . . . 2. *S. elegans.*
- Leaves elliptical, pointed. Pedicels 25–50. Buds oblong, 2 lines. Petals oblong. Filaments subulate, on thick columnar disk . . 3. *S. macrocarpa.*
- Leaves oblong-elliptical, pointed. Pedicels often crowded. Anther-cells distinct, divergent below . . . . . 4. *S. senegalensis.*
- Leaves strictly oblong, abruptly obtusely linear-acuminate. Pedicels 3–8. Petals ovate-elliptical . . . . . 5. *S. oblongifolia.*
- Leaves large, very coriaceous, oblong-elliptical. Pedicels ∞. Calyx-lobes coriaceous with scarious margins. Anther-cells confluent above . . . . . 6. *S. pyriformis.*

Leaves elliptical, shining, subentire. Pedicels few, rarely pedunculate. Anther-cells nearly confluent . . . . . 7. *S. cornifolia.*
Leaves elliptical, obtusely serrulate, shining and reticulate above. Flowers few, rather large, buds 2 lines long and broad. Petals elliptical . . . . . 8. *S. chlorantha.*
Leaves elliptical, subentire, obtuse. Pedicels 1–6. Filaments on thick disk. Anther-cells subconfluent, divergent below . . . . 9. *S. prinoides.*
Leaves elliptical, serrulate. Pedicels few–∞. Filaments narrow-linear. Anthers reniform; cells subconfluent . . . . . 10. *S. cerasifera.*
Anthers roundish or transversely oblong. (Compare 10. *S. cerasifera.*)
Pedicels very few. Filaments subulate, recurved over thick disk. Petals elliptical . . . . . 11. *S. pallescens.*
Pedicels 2–∞. Anthers nearly sessile. Petals orbicular, patent . 12. *S. debilis.*
Pedicels few, slightly thickened above. Filaments short, linear. Outer calyx-lobes thickened . . . . . 13. *S. Mannii.*

Imperfectly known species, see p. 377.

1. **S. lucida,** *Oliv.* A climber, wholly glabrous. Extremities terete, smooth. Leaves rather coriaceous, elliptical, shortly obtusely and often rather abruptly acuminate, narrowed into the petiole, subentire or obscurely serrulate above, the margin narrowly revolute when dry, shining above, reticulation scarcely prominent, 2½–3½ in. long, 1¼–1¾ in. broad; petiole ¼–½ in. Flowers in very short, forking, bracteolate cymes not exceeding ⅓–¾ in. in our specimen; pedicels ¼ in. or less. Calyx-lobes broadly ovate, inner rather larger. Petals narrow-oblong. Filaments subulate, nearly as long as the style, inserted upon a thick slightly raised disk supporting the tapering ovary. Fruit not seen.

Upper Guinea. Old Calabar, *Thomson!*

2. **S. elegans,** *Welw. mss.* A glabrous climber. Extremities longitudinally marked with 3–6 fine slightly raised or subulate lines; punctate with minute verrucæ. Leaves rather small, thinly coriaceous, elliptical, shortly and obtusely acuminate, obtusely serrulate, shining above, 1½–2½ in. long, ¾–1¼ in. broad; petiole channelled, ⅛ in. Flowers small, numerous, in axillary, shortly pedunculate, cymose fascicles scarcely exceeding ⅓–½ in.; pedicels slender, 2–3 lines, umbellately fascicled or common peduncle shortly divided. Buds 1 line or less. Calyx-lobes subequal, rotundate. Petals broadly oblong-elliptical, imbricate, at length recurved. Filaments linear, inserted within a small corrugated disk; anthers distinctly 2-celled, dehiscing longitudinally. Fruit not seen.

Lower Guinea. Pungo Andongo, Angola, *Dr. Welwitsch!*

3. **S. macrocarpa,** *Welw. mss.* A glabrous climber with verruculose extremities. Leaves subopposite, thinly coriaceous, elliptical to oblong-elliptical, broadly and usually shortly pointed or acuminate, cuneate or slightly rounded at the base, serrulate, reticulation subprominent, 3–6 in. long, 1–3 in. broad; petiole ¼ in. more or less, channelled above. Flowers rather large in many-flowered (25–50), axillary, radiating fascicles; pedicels slender, ½–¾ in., from a short or obsolete common peduncle. Buds oblong, 2 lines long. Calyx-lobes unequal, inner rotundate. Petals oblong, imbricate, at length

reflexed. Stamens and ovary raised upon a short thick columnar disk. Filaments subulate, 1 line long; anthers 2-celled, dehiscing longitudinally. Fruit many-seeded, "the size of a goose's egg."

Upper Guinea. Old Calabar, *Thomson!*
Lower Guinea. Pungo Andongo, Angola, *Dr. Welwitsch!*

4. **S. senegalensis,** *DC. Prod.* i. 570. A glabrous shrub; the extremities usually verruculose, with minute simple or lobed warts. Leaves (drying reddish-brown, paler beneath) rather coriaceous, oblong-elliptical, shortly and obtusely pointed or acuminate, rounded or cuneate at base, obtusely and often obscurely serrulate or subentire, shining above, 2½–4½ in. long, 1–1¾ in. broad; petiole channelled above, ⅛–¼ in. Flowers in axillary sessile fascicles, often rather crowded; pedicels 3–5 lines, rather slender and not thickened upwards. Calyx-lobes ovate to rotundate; the outer smaller. Petals ovate-elliptical, imbricate. Filaments from the short thick disk surrounding the base of the sessile ovary, subulate, at length recurved, nearly as long as the style; anthers 2-celled, dehiscing longitudinally; the lobes slightly divergent below. Fruit in our specimen (probably immature) broadly ellipsoidal, 1–1¼ in. long.—Fl. Senegamb. i. 113. t. 27. *S. affinis,* Hook. f. Fl. Nigrit. 281.

Upper Guinea. Senegambia, *Perrottet!* Sierra Leone, *Afzelius! T. Vogel! Whitfield!* and others; Bagroo river, *Mann!*
Lower Guinea. Congo, *Smith?*

5. **S. oblongifolia,** *Oliv.* Wholly glabrous. Leaves rather coriaceous, strictly oblong or occasionally slightly broader above the middle, rather abruptly narrowed into a linear obtuse acumen, base cuneate, finely serrulate, rather paler beneath and midrib rather prominent, reticulation scarcely prominent, 2–2½ in. long (including the acumen of ¼–½ in.), ⅔–1 in. broad. Flowers in axillary fascicles of 3 or 4–8, from a very short (1–2 lines) or obsolete common peduncle; pedicels rather stout, usually diverging, ¼–½ in. long. Buds oblong, obtuse, 2 lines long. Calyx minute, with ovate-rotundate subequal lobes. Petals ovate-elliptical, broadly imbricate. Stamens and ovary raised upon a thick distinct columnar disk; anthers 2-celled, elliptic-cordate and as long as the filament before expansion. Ovary tapering into the style, which equals the stamens. Fruit not seen.

Upper Guinea. Gaboon river, *Mann!*

6. **S. pyriformis,** *Walp. Rep.* i. 402. A shrub or small tree, wholly glabrous. Leaves large, very coriaceous, oblong-elliptical (often broadly), usually shortly and obtusely, often abruptly, cuspidate, more or less rounded or broadly cuneate at base, usually entire or undulate, 3–8 in. long, 1¾–4½ in. broad; petiole ¼–¾ in.; midrib prominent beneath, lateral nerves and reticulation subprominent. Flowers in axillary, several- or many-flowered, sessile fascicles, equalling the petioles. Calyx-lobes rotundate, coriaceous, with scarious margins; the inner larger. Petals orbicular, coriaceous. Filaments short, revolute, broadly dilated below, inserted upon a very short thick disk surrounding the base of the ovary; anthers 2-celled; the cells nearly confluent above, broadly divergent below. The fruit is described as pyriform and obtusely 3-gonus.—*Calypso pyriformis,* Don, Gard. Dict. i. 629.

Upper Guinea. Sierra Leone, *Don !* Senegambia ! river Camaroons and Old Calabar, *Mann !*

Var. *obtusa.* Leaves very obtuse or retuse.

Mozamb. Distr. Shupanga, Zambesi, *Dr. Kirk !*

S. elongata, Hook. f. Fl. Nigrit. 282, from the very fragmentary specimen in the Herbarium of the British Museum (St. Thomas, *Don !*), I take to be a form of *S. pyriformis*, with the leaves narrowed to the petiole.

7. **S. cornifolia,** *Hook. f. Fl. Nigrit.* 281. Wholly glabrous. Leaves coriaceous, elliptical or oblong-elliptical, usually shortly and obtusely acuminate, broadly cuneate or rounded at base, entire obsoletely serrulate or undulate, shining above, reticulation scarcely prominent beneath, 3–4(–6) in. long, 1¼–2(–3) in. broad; petiole ¼–⅓ in. Flowers small, globose or ovoid in bud, in few-flowered axillary fascicles or very shortly pedunculate subumbellate cymes; pedicels ⅓–½ in. Calyx-lobes rotundate or ovate; outer smaller. Petals rotundate. Anthers horseshoe-shaped, dehiscing longitudinally, the lobes nearly or quite confluent at the apex; filaments from within a thickened disk. Young fruit pyriform.

Upper Guinea. Sierra Leone, *T. Vogel !* Gaboon river, *Mann !*

Var. *crassisepala.* Sepals much thickened. Disk cupuliform. Pedicels borne on a short, stout, common peduncle. Perhaps a distinct species.

Old Calabar river, *Mann !*

8. **S. chlorantha,** *Oliv.* A glabrous "twining shrub." Leaves coriaceous, shining and reticulate above, elliptical, shortly and obtusely cuspidate, broadly cuneate or rounded at the base, obtusely serrulate, 3–3½ in. long, 1¼–1¾ in. broad; petiole channelled above, ¼ in. Flowers in few-flowered axillary fascicles, from an obsolete common peduncle, rather large, "green, fragrant," about 2 lines long and broad before expansion. Pedicels slightly thickened upwards, ⅓–½ in. Outer calyx-lobes distinctly smaller, ovate; inner rotundate. Petals broadly imbricate, elliptical. Stamens and ovary raised upon a very short columnar disk; anthers 2-celled, the lobes nearly parallel or but slightly divergent below.

Upper Guinea. Nupe, Niger, *Barter !*

Described from a single small specimen.

9. **S. prinoides,** *DC. Prod.* i. 571 ? Wholly glabrous. Leaves coriaceous, elliptical or oval-elliptical, obtuse, with or without a short broad cusp or somewhat narrowed to the obtuse apex, base from broadly rounded to cuneate, entire or obscurely serrulate, paler beneath, with but slightly prominent venation, 2–3½ in. long, ⅔–2½ in. broad; petiole ¼–½ in. Axillary sessile fascicles 1–6-flowered; pedicels equalling or shorter than the petiole. Calyx-lobes ovate-rotundate. Petals ovate or elliptical, obtuse. Stamens inserted upon a short, thick, raised, fleshy disk; filaments dilated below, at length recurved; anthers 2-celled, lobes divergent below, nearly confluent above. I have not seen ripe fruit.

Upper Guinea. Grand Bassa, *T. Vogel !*

S. prinoides is widely spread in India. The only African specimens which I have seen are too imperfect to warrant positive identification with the Indian plant, but there is not at present any ground of specific distinction.

10. **S. cerasifera,** *Welw. mss.* An extensively climbing, wholly glabrous shrub. Extremities marked with faint decurrent lines or ridges. Leaves coriaceous, rather large, elliptical or oblong-elliptical, obtusely acuminate, more or less broadly cuneate at base, serrulate, shining above, 2½–6 in. long, 1¼–2½ in. broad; petiole slightly grooved above, ¼–½ in. Flowers in axillary, sessile, several- or many-flowered fascicles, greenish-yellow. Calyx-lobes rotundate, very obtuse. Petals oblong-elliptical. Filaments narrow-linear, inserted upon a broad, short, thick gynophore; anthers reniform; cells nearly or quite confluent. Fruit cherry-like, deep orange, (*Dr. Welwitsch*).

Lower Guinea. Pungo Andongo, Angola, *Dr. Welwitsch!* (? Old Calabar, *Mann!*)
Allied to *S. pyriformis;* differing in its narrow filaments, serrulate leaves, and fruit.

11. **S. pallescens,** *Oliv.* Wholly glabrous. Extremities terete or slightly flattened below the internodes, green, smooth. Leaves pale when dry, thinly coriaceous, oblong-elliptical, narrowed to each end, obtusely pointed, serrulate, reticulation subprominent beneath, 3½–6 in. long, 1⅓–2½ in. broad; petiole ⅛–¼ in., dilated above into the lamina. Flowers in small, few-flowered, axillary, sessile fascicles; pedicels ⅛–⅓ in. long in fruit. Inner calyx-lobes considerably larger, rotundate. Petals spreading, elliptical. Filaments subulate or narrow-linear, at length recurved over the thick annular cushion-like disk. Anthers minute, transversely elliptical, dehiscing transversely, "1-celled." Ovary conical, tapering into the short style. Young fruit obovoid.

Upper Guinea. Nupe, Niger, *Barter!*

12. **S. debilis,** *Walp. Rep.* i. 402. Wholly glabrous, with smooth extremities. Leaves rather coriaceous, oblong-elliptical or elliptical, obtusely acuminate or cuspidate, base usually narrowed obtuse or emarginate, rather distantly and obscurely serrulate, midrib and principal lateral veins rather prominent beneath, 1¾–4½ in. long, ¾–1¾ in. broad; petiole very short, sinuously channelled, 1½–2 lines long. Flowers small, in axillary fascicles of 2–5 or more on slender erect pedicels, ½–1¼ in. long. Calyx rather fleshy; lobes, at least the inner, rotundate. Petals orbicular, patent. Disk shallow, pentagonal, with a slightly prominent margin. Anthers nearly sessile, minute, transversely oval, "1-celled."—*Calypso debilis,* Don, Gard. Dict. i. 629.

Upper Guinea. Sierra Leone, *Don;* Senegambia! Fernando Po, *Mann!*

13. **S. Mannii,** *Oliv.* A shrub of 15–20 ft. (*Mann*), wholly glabrous. Leaves rather coriaceous, oblong-elliptical to oblanceolate-oval or oval, obtusely or rather acutely acuminate, more or less cuneate or scarcely rounded at the base, faintly serrulate, paler beneath with obscure reticulation, 3–6 in. long, 1½–2½ in. broad; petiole slightly channelled above, 1–2 lines. Flowers small, in axillary few-flowered fascicles; common peduncle usually obsolete; pedicels slightly thickened upwards, ¼–⅓ in. long. Outer calyx-lobes rather thick ovate obtuse; inner rotundate. Petals spreading, obliquely elliptical. Disk inconspicuous. Filaments short, linear, flattened; anthers rotundate, dehiscing transversely. Ovary half-immersed. Fruit not seen.

Upper Guinea. Fernando Po, *Mann! Barter!*

IMPERFECTLY KNOWN SPECIES.

14. **S. rufescens,** *Hook. f. Fl. Nigrit.* 283. The only specimen which I have seen is scarcely sufficient for examination. It is not identifiable with any other. Glabrous with verruculose bark. Leaves coriaceous, reddish when dry, oblong-elliptical to oblanceolate, obtusely acuminate, narrowed to a cuneate base, distantly and obscurely denticulate, coarser reticulation subprominent beneath, 2–3 in. long, ¾–1¼ in. broad; petiole 1–2 lines. Flowers 1 or 2 in an axil, on short simple pedicels. "Calyx-lobes roundish; petals shortly clawed. Disk flat, ample. Filaments very short; anthers transversely elongate, cylindrical."

Upper Guinea. Sierra Leone, *T. Vogel!*

15. **S. erecta,** *Walp. Rep.* i. 402. I have not seen flowering specimens. Our specimens in leaf and fruit are glabrous; leaves lanceolate or oblong-elliptical, obtusely acuminate, rounded or narrowed to the base, regularly serrulate, with subprominent reticulation beneath, 1½–3 in. long, ¾–1 in. broad; petiole 1–2 lines. Fruit subsessile or very shortly stalked, subglobose.—*Calypso erecta,* Don, Gard. Dict. i. 629.

Upper Guinea. Sierra Leone, *Don! Barter!*
Lower Guinea. Ambaca, Angola, *Dr. Welwitsch!*

16. **S. Ducis-Wurtembergiæ,** *Hochst. in Flora,* 1844, 307 (*adnot.*). Shrub. Branches subterete, with ashen bark. Leaves obovate, obtusely serrate, narrowed at the base into a short petiole, coriaceous, glabrous, copiously reticulate especially beneath. Axillary panicles dichotomous, six times shorter than the leaves.

Nile Land. Nubia, Sennar.
Unknown to me.

S. africana, DC. Prod. i. 570 (*Tonsella,* Willd. Sp. Pl. i. 194), described as with "Leaves obtuse, sparingly glandulose-denticulate; anthers sessile," I have no means of identifying.

Order XLII. RHAMNEÆ (by Mr. W. B. Hemsley).

Flowers regular, hermaphrodite or polygamous. Calyx campanulate urceolate or cylindrical; the tube generally more or less united with the ovary or disk and persistent; limb 5-lobed; lobes valvate, deciduous or rarely persistent, often with a raised line or keel down the middle internally. Petals 4 or 5, hood-shaped or involute, often enclosing the stamens, inserted on the throat of the calyx and alternating with its lobes, rarely absent. Stamens 4 or 5, opposite the petals when the latter are present; filaments filiform, rarely dilated; anthers small, 2-celled or rarely with the 2 cells confluent, enclosed in the petals or rarely protruding beyond them. Disk large, fleshy, filling the calyx-tube, annular or cup-shaped and free or lining the calyx-tube, entire or lobed, glabrous or tomentose. Ovary sessile, free or imbedded in the disk, superior or more or less adherent to the calyx-tube, 2-, 3- or 4-celled; style short, entire or divided into as many lobes as ovary-cells; stigmas terminal,

capitate or club-shaped. Ovules solitary, erect, anatropous; raphe dorsal or rarely lateral. Fruit a drupe or capsule, 1–4-celled, with the persistent calyx-tube forming a ring at the base or more or less covering it, separating from the axis into as many cocci as cells or inseparable. Seeds solitary, erect, ovoid, angular or compressed, often arillate; testa coriaceous, crustaceous or membranous, often shining; albumen fleshy or horny, often thin, very rarely none. Embryo orthotropous, with thick, flat or plano-convex cotyledons, and a short inferior radicle.—Shrubs or trees, erect or climbing, often spiny, rarely cirrhose. Leaves simple, alternate or opposite, entire or toothed; stipules small and deciduous or spinose and persistent. Flowers small, green or yellow, generally arranged in axillary cymes, seldom terminal and racemose or paniculate.

A rather extensive family, represented throughout the temperate and tropical regions of the whole world. Of the eight tropical African genera, six have a wide range both in the Old and New World; one, *Helinus*, is confined to Africa and India, and the anomalous genus *Lasiodiscus* is endemic. The Order is generally readily distinguished from its allies by the valvate sepals, stamens opposite the petals, and drupaceous or capsular, not baccate fruit.

Leaves alternate.
- Ovary superior or half-inferior.
  - Leaves 3–5-nerved from the base.
    - Drupe 1–3-celled, fleshy. Stipules usually spinescent . . . 2. ZIZYPHUS.
    - Drupe dry, separating into 3-cocci. Stipules deciduous . . . 5. COLUBRINA.
  - Leaves penninerved.
    - Drupe oblong, 2-celled. Ovary immersed in the disk . . . 3. BERCHEMIA.
    - Drupe spherical, with 2–4 pyrenes, 2–4-celled ovary seated on the disk. Disk thin . . . . . 4. RHAMNUS.
    - Nut 1-celled, produced upwards into an oblong wing. Ovary immersed in the disk . . . . . 1. VENTILAGO.
- Ovary inferior.
  - Fruit 3-winged. Flowers racemose . . . . . 6. GOUANIA.
  - Fruit globular. Flowers umbellate . . . . . 7. HELINUS.

Leaves opposite, with interpetiolar stipules. Ovary half-inferior . . 8. LASIODISCUS.

1. VENTILAGO, Gærtn.; Benth. et Hook. f. Gen. Pl. i. 375.

Calyx 5-lobed; lobes spreading. Petals 5 or 0, obcordate or 2-lobed, hood-shaped. Stamens 5, adnate to the base of the petals and scarcely exceeding them when present; filaments very short, filiform; connective often prolonged. Disk obscurely 5-lobed or angled, glabrous or pubescent. Ovary globular, immersed in the disk, 2-celled; style very short, 2-fid. Nut globular, more or less included in the calyx-tube, produced upwards into an oblong or linear coriaceous wing, 1-celled, 1-seeded, indehiscent. Seed globular; testa membranous; albumen 0. Cotyledons thick and fleshy; radicle very short, inferior.—Climbing, glabrous or pubescent shrubs or trees. Leaves alternate, penninerved. Stipules minute, deciduous. Flowers small, pedicellate, clustered in terminal or axillary panicles.

A genus of about 10 species, confined to the tropical regions of the Old World.

1. **V. leiocarpa,** *Benth. in Journ. Linn. Soc.* v. 77. A glabrous, climbing shrub or small tree. Leaves shortly petiolate, from ovate to oblong,

acuminate obtuse or acute, obscurely crenate-serrate, slightly undulate, 2–3 in. long, shining above; petioles pubescent. Flowers minute, pubescent, in axillary clusters; the upper ones sometimes forming a short leafless, simple panicle or raceme; the pedicels about a line long. Nut 2 or 3 lines in diam., adherent calyx-tube reaching about the middle; terminal wing smooth and shining, 1½–2 in. long and about 4 lines broad.—*V. maderaspatana*, Benth. in Kew Journ. Bot. iii. 42, not of Gærtn. *Celastrus diffusus*, Don, Gard. Dict. ii. 6.

Upper Guinea. (In flower), St. Thomas, *Don !* (in fruit), Eppah, *Barter !*

I do not feel quite satisfied of the identity of the two gatherings above noted.

This species also occurs in Malacca, Hongkong, and New Caledonia.

2. ZIZYPHUS, Juss.; Benth. et Hook. f. Gen. Pl. i. 375.

Flowers hermaphrodite or polygamous. Calyx-tube broadly obconical; limb 5-lobed; lobes triangular-ovate, acute, spreading, keeled inside. Petals 5, rarely 0, hood-shaped, incurved. Disk flat, pentagonal, often with 10 depressions; margin free. Stamens 5, included in the petals or exceeding them; filaments subulate; anthers 2-celled, opening longitudinally. Ovary immersed in the disk and adnate to its base, 2-, rarely 3- or 4-celled. Styles 2, diverging or combined; stigmas papillose. Drupe fleshy, globose or oblong; putamen woody or horny, 1–3-celled, 1–3-seeded. Seeds plano-convex; testa thin, brittle, smooth and shining; albumen 0 or very little. Cotyledons thick; radicle short.—Shrubs or trees, often decumbent or creeping and furnished with sharp, curved or straight spines. Leaves alternate, petiolate, 3–5-nerved from the base, entire or crenate, coriaceous. Stipules either 1 or rarely both spinescent, deciduous. Flowers small, greenish, in small, axillary cymes. Fruit often edible.

A genus of about 50 species, scattered over the tropics and subtropics, chiefly in Asia and America, a few extending to the Pacific islands and Australia.

Leaves glabrous above, beneath as well as the young branches with a dense ferruginous or grey tomentum, very rarely almost glabrous. Disk with 10, more or less distinct, cavities . . . . . 1. *Z. jujuba.*

Leaves nearly or quite glabrous. Young branches pubescent. Disk uniformly pubescent or glabrous . . . . . 2. *Z. mucronata.*

Leaves pale, glaucous, green, glabrous, except when quite young. Branches drooping, glabrous; bark white, shining. Disk with a fringe of hairs around the base of the style . . . . . 3. *Z. Spina-Christi.*

1. **Z. jujuba,** *Lam.; DC. Prod.* ii. 21. A loosely branched tree or shrub, 10–40 ft. high, rarely, in arid places trailing, with very much reduced leaves, with or without stipulary prickles. Leaves petiolate, 1–5 in. long, ovate oblong or nearly orbicular, obtuse or acute at the apex, obtuse or rarely slightly narrowed and equal or unequal at the base, serrulate, glabrous above, beneath as well as the petioles young branches and flowers with a dense, short, ferruginous or nearly white tomentum, very rarely almost glabrous. Stipules spinescent, one or both recurved, rarely absent. Cymes subsessile or shortly pedunculate, 10–30-flowered. Disk more or less distinctly 10-foveolate. Ovary 2-celled; styles short, united to the middle; stigmatic lobes erect. Drupe spherical about 1½ in. in diam., 2- or, by abortion, 1-celled.—*Z. abyssinicus*, Hochst. Rich. Fl. Abyss. i. 136. *Z. xylopyrus*,

Hochst. in Schimp. Pl. Abyss. (not of Willd.). *Z. orthacantha*, DC. Prod. ii. 21. (ex descr.).

Upper Guinea. Nigritania, *Barter! Mann!*
Lower Guinea. Angola, *Dr. Welwitsch!*
Mozamb. Distr. Mozambique, *Dr. Peters!* Zambesi, *Drs. Kirk and Meller!*

This is an extremely variable species, and presents considerable difficulty in defining its limits. Two widely different forms occur, which, without the connecting links, would never be taken for the same species. One, *Z. abyssinicus*, Hochst., with broadly ovate acute leaves, very oblique at the base, and 2–5 in. long; the other, the ordinary *Z. jujuba*, with oblong or orbicular, very obtuse leaves, usually nearly equal at the base; but the numerous intermediate forms will not even admit of their being distinguished as permanent varieties. Besides these two forms, there is the cultivated state from W. Africa, where it is used for hedges and periodically topped, which is much more densely branched, the leaves smaller and the stipular prickles very abundantly developed. In sterile places and on the coast the leaves are smaller and the prickles more numerous.

Also in Madagascar, Australia, tropical Asia, etc.; it is extensively cultivated for its fruit.

2. **Z. mucronata,** *Willd.; Harv. et Sond. Fl. Cap.* i. 475. (With the synonyms adduced.) A tree of 20–30 ft., or sometimes shrubby, with zigzag branches, with or without stipular prickles. Young branches, petioles, and inflorescence rusty puberulous pubescent or almost glabrous. Leaves petiolate, broadly ovate or ovate-cordate, acuminate acute or obtuse, mucronate, equal or unequal at the base, 1½–3 in. long, crenate-serrate, with a few scattered hairs beneath principally on the veins or quite glabrous. Stipules spinescent, 1 straight the other recurved, or 1 or both wanting (on some branches), or reduced and deciduous. Cymes axillary, about the length of the petioles, 10–20-flowered. Calyx pubescent or glabrous; lobes acute. Ovary 2-celled. Styles recurved. Drupe 2-celled, 6–8 lines in diam., bright red.—*Z. Baclei*, DC. Prod. ii. 20; Guill. et Perr. Fl. Seneg. i. 145. t. 37. *Z. mitis*, Rich. Fl. Abyss. i. 137.

Upper Guinea. Niger, *Barter!* Attah, *T. Vogel!*
Nile Land. Abyssinia, *Petit;* Sennar, *Cienkowski.*
Lower Guinea. Huilla and Pungo Andongo, Angola, *Dr. Welwitsch!*
Mozamb. Distr. Shire river, *Drs. Kirk and Meller!*

The species is confined to Africa, ranging through the tropics to the Cape, where it is abundant.

3. **Z. Spina-Christi,** *Willd.; DC. Prod.* ii. 20. A tree or shrub with white long flexuose or short intricate branches. Leaves ovate ovate-oblong or lanceolate, obtuse or acute, often mucronate, equal at the base, crenate-serrate, 1–3 in. long, glabrous or slightly pubescent beneath when young especially along the veins; petioles ½–1 in. long; stipular prickles when present short, both or 1 only recurved. Cymes pubescent, few- or many-flowered, sessile or on peduncles from a line to an inch or more in length. Flowers large for the genus. Calyx densely pubescent. Disk large, furnished with a fringe of hairs around the base of the styles. Styles united above the middle and then spreading, not recurved. Drupe 2-celled, large, fleshy, spherical.

Upper Guinea. Senegambia! Niger, *Barter!*
North Central. Kouka, *E. Vogel!*
Nile Land. Nubia (Webb, Frag. Fl. Æthiop.), Abyssinia, *Schimper!* and others.

We have what appears to be a fourth species from Congo, *Smith*, and Tette, *Kirk*, but only in young fruit and insufficient for description. Leaves ovate-lanceolate or oblong, remotely toothed, glabrous or slightly pubescent beneath, immature fruit, obovate. We have also a fragment of another very distinct species from the Zambesi Expedition, with leaves strongly 3-nerved and tomentose on both sides. Both are destitute of stipulary spines.

3. **BERCHEMIA,** Neck.; Benth. et Hook. f. Gen. Pl. i. 377.

Calyx-tube short, hemispherical or turbinate, 5-lobed; lobes ovate, acute, spreading, with a raised line inside. Petals 5, obovate or lanceolate, hood-shaped. Stamens 5, equalling the petals; anthers large; filaments filiform. Disk clothing the calyx-tube, margin free. Ovary immersed in the disk, free, ovoid, 2-celled, attenuated into a 2-fid style; stigmas terminal, obtuse. Drupe oblong, obtuse or acute; putamen crustaceous or woody, 2-celled. Seeds linear-oblong; testa membranous; raphe lateral; albumen fleshy. Cotyledons narrow-oblong; radicle short.—Trees or shrubs, climbing or erect. Leaves alternate or subopposite, petiolate, ovate or oblong, obtuse or acute, coriaceous, penninerved, glaucous beneath. Stipules small, deciduous. Flowers small, sometimes polygamous, axillary and arranged along the spreading branches of terminal panicles, sessile or pedicellate, solitary or clustered. Drupes black, purple or yellow.

A genus of about 10 species from N. India, China, Java, Africa, and N. America.

1. **B. discolor,** *Hemsl.* A shrub or small tree, glabrous in all its parts. Leaves alternate or subopposite, petiolate, ovate ovate-elliptical or lanceolate, obtuse or acute, sometimes slightly unequal at the base, 1–2½ in. long, entire or obscurely crenate, subcoriaceous, glaucous beneath, shining above, lateral nerves conspicuous. Stipules very deciduous. Cymes axillary, sessile or shortly pedunculate, 6–10-flowered; pedicels 2–3 lines long. Drupe large, fleshy, yellow, 6–8 lines long and 2–3 in. in diam., 2-celled, 2-seeded.—*Scutia discolor,* Klotzsch in Peters' Mossamb. Bot. 110. t. 21.

Mozamb. Distr. Senna, *Dr. Peters* (in flower only); Tette, *Dr. Kirk!* "Wood resinous, fruit edible," *Kirk.*

Confined, as far as at present known, to the E. coast of Africa.

This differs from all previously described species of the genus in its axillary inflorescence and larger fruits.

We have what appears to be the same plant from Natal, *Gerrard.*

4. **RHAMNUS,** Linn.; Benth. et Hook. f. Gen. Pl. i. 377.

Flowers hermaphrodite or polygamously dicœcious. Calyx-tube urceolate; limb 4–5-lobed; lobes triangular-ovate, erect or spreading, keeled inside. Petals 4, 5 or none, inserted on the margin of the calyx-tube considerably above the ovary, hood-shaped or flat. Stamens 4 or 5, with very short filaments. Disk clothing the calyx-tube, margin thin. Ovary free, ovoid, 3- or 4-celled. Styles 3 or 4; stigmas obtuse, papillose. Drupe baccate, globose or oblong, encircled at the base by the calyx-tube, with 2–4 pyrenes; pyrenes horny or cartilaginous, dehiscing inwardly or indehiscent. Seeds obovate; testa membranous or crustaceous, smooth or furrowed at the back; raphe

dorsal, ventral or lateral; albumen fleshy. Cotyledons flat or with recurved margins, thin; radicle short.—Shrubs or trees. Leaves alternate or subopposite, petiolate, deciduous or evergreen, penninerved, entire or dentate. Stipules small, deciduous. Flowers axillary, racemose or cymose.

A genus of about 50 species, chiefly from the temperate and warmer parts of Europe, Asia, and America, rarer in the tropics.

Unarmed.

Leaves ovate lanceolate or oblong, acutely acuminate. Flowers 5-merous, pedicellate . . . . . 1. *R. prinoides.*

Spinescent.

Leaves obovate-oblong, obtuse, rarely acute. Flowers 4-merous, pedicellate . . . . . 2. *R. Staddo.*

Leaves oval acute or obtuse. Flowers 5-merous, subsessile . . . . 3. *R. spiciflorus.*

1. **R. prinoides,** *L'Hérit.; DC. Prod.* ii. 24. A shrub or small tree, glabrous or young branches slightly puberulous. Leaves alternate, petiolate, varying from elliptical to ovate lanceolate or oblong, acutely acuminate, obtuse or narrowed to the base, serrate, 2–4 in. long, coriaceous, shining above. Flowers 5-merous, 2–4 together in the axils of the leaves; pedicels 4–6 lines long. Berry globular, 2–3 lines in diam., with 3 or 4 1-seeded pyrenes.—Sert. Angl. 6. t. 9. *R. pauciflorus,* Hochst.; Rich. Fl. Abyss. i. 137.

Nile Land. Abyssinia, *Schimper!* and others.

Confined to E. and S. Africa, and very abundant in extratropical S. Africa, but we have seen no specimens from the intermediate country.

2. **R. Staddo,** *Rich. Fl. Abyss.* i. 138. Usually a small shrub, but sometimes attaining the dimensions of a tree. Branches thick, black, glabrous, terminating in spines. Leaves crowded, alternate, petiolate, obovate or oblong, obtuse rarely acute, narrowed at the base, membranous, crenate, glabrescent, about an inch long. Flowers spicate, glabrous, 4-merous, pedicellate, on short, thick, lateral, scaly branches. Calyx-lobes somewhat oval, acute, 3-nerved. Petals small, linear. Ovary 3-celled; stigmas 3. (Description from Richard.)—*R. infusionum,* Ferr. et Galin. Voy. Abyss. iii. 111.

Nile Land. Abyssinia! At an elevation of about 8000 ft.

We have only seen a barren branch. Endemic in Africa.

3. **R. spiciflorus,** *Rich. Fl. Abyss.* i. 138. A shrub with long, twiggy, pubescent branches, terminating in spines, bark greyish. Leaves alternate or subopposite, very shortly petiolate, oval, acute or obtuse, coriaceous, entire, 5–8 lines long and 4–8 broad. Flowers small, 5-merous, axillary solitary or in short spikes. Calyx-lobes oval, subacute. Fruit subglobose, the size of a pea, obtuse, with 3 pyrenes. (Description from Richard.)

Nile Land. Abyssinia.

Endemic in Africa. We have seen no specimens. This and the preceding one are imperfectly known and probably varieties of one species.

5. **COLUBRINA,** Linn.; Benth. et Hook. f. Gen. Pl. i. 379.

Calyx-tube hemispherical; limb 5-cleft; lobes spreading, triangular. Petals 5, clawed, inserted below the disk, hood-shaped. Stamens 5, included in the petals; filaments filiform; anthers ovate, 2-celled. Disk fleshy, filling the calyx-tube. Ovary immersed in the disk and adhering to it, 3-celled, tapering into a 3-lobed style with obtuse stigmas. Capsule nearly globular, slightly 3-lobed, dehiscing septicidally into 3 membranous or crustaceous cocci. Epicarp dry and thin or succulent, the persistent calyx-tube covering about one-third of its length. Seeds obovoid, compressed, 3-gonous; testa smooth, shining, coriaceous; albumen fleshy, thin. Cotyledons flat or incurved.—Scandent or erect shrubs or trees. Leaves alternate, 3-nerved at the base or penninerved. Stipules small, deciduous. Flowers small, in axillary clusters.

A genus of about 10 species, 9 of which are confined to America and the other one to the tropics of the Old World.

1. **C. asiatica,** *Brongn. in Ann. Sc. Nat.* x. 369. An erect glabrous shrub or small tree with long, unarmed, slender branches. Leaves petiolate, ovate or broadly cordate, abruptly acuminate or gradually narrowed acute or obtuse, rotundate or subcordate at the base, 2–3 in. long, crenate-serrate, 3-nerved at the base, penninerved upwards, glabrous and shining. Flowers small, green, in shortly pedunculate axillary cymes about the length of the petiole. Fruit 3–4 lines in diam., slightly depressed at the top, furrowed opposite the dissepiments, dehiscing into 3 or rarely 4 cocci.

Mozamb. Distr. Rovuma river, *Dr. Meller!* mouth of the Zambesi, *Dr. Kirk!* Also south of the tropic at Delagoa Bay, *Forbes!*

Common throughout tropical Asia, extending to the Philippine Islands and tropical Australia.

6. **GOUANIA,** Linn.; Benth. et Hook. f. Gen. Pl. i. 385.

Flowers polygamous. Calyx-tube short, obconic, adhering to the ovary; limb 5-lobed. Petals 5, hood-shaped or flat, inserted below the margin of the disk. Stamens 5, included under the petals or exceeding them; anthers dehiscing longitudinally. Disk glabrous or hairy, epigynous, filling the calyx-tube, 5-angled or lobed. Ovary immersed in the disk, 3-celled. Style 3-partite or -lobed; stigmas small. Fruit coriaceous, quite inferior, crowned by the persistent calyx-lobes, 3-winged, 3-coccous; cocci woody, indehiscent, separating from the 6-partite axis; wings large, rotundate. Seeds obovate, plano-convex; testa horny, shining; albumen thin. Cotyledons rotundate, broad, radicle very short.—Tall, climbing, cirrhose shrubs, glaucous or tomentose. Branches slender, elongate. Leaves alternate, petiolate, entire or dentate, 3-nerved from the base or penninerved. Stipules oblong or lanceolate, deciduous. Flowers small, in terminal or axillary racemes, rachis often passing into tendrils.

1. **G. longipetala,** *Hemsl.* A climbing shrub with terete glabrous

branches. Leaves penninerved, ovate, acuminate acute, obtuse or slightly cordate at base, 2–3 in. long, entire towards the base crenate-dentate upwards, glabrous; petioles ½–1 in. long, glabrescent. Flowers in interrupted racemes terminating the lateral branches; rachis stout as well as the pedicels, clothed with a dense ferruginous tomentum. Calyx glabrous or with a few scattered hairs; lobes brown, triangular, keeled on the inside, incurved in æstivation. Petals (at least in the male flowers) double the length of the calyx-lobes, white, spathulate, with the margins involute enclosing the filaments; anthers projecting beyond their tips. Fruit glabrous; wings 4–6 lines broad.

Upper Guinea. Fernando Po and river Kongui, *Mann!* (in flower).
Mozamb. Distr. Shupanga; *Dr. Kirk!* (in fruit).

The species as above characterized is confined to tropical Africa, but it is closely allied to *G. leptostachys*, DC., an Asiatic species, and *G. domingensis*, DC., and may eventually have to be united with one or both. It differs principally in its relatively much longer petals with the anthers projecting beyond their tips.

7. HELINUS, E. Mey.; Benth. et Hook. f. Gen. Pl. i. 385.

Calyx-tube broadly obconical, adnate to the ovary; limb 5-lobed, spreading. Petals 5, hood-shaped, inserted on the margin of the disk. Stamens 5, about the same length as the petals; anthers 2-celled, dehiscing longitudinally. Disk flat, filling the calyx-tube. Ovary 3-celled. Styles short, united at the base; lobes spreading or erect. Fruit wholly inferior, obovate or globose, hollowed at the top, 3-coccous; cocci crustaceous, at length separating from the 3-partite axis. Seeds plano-convex; testa coriaceous, shining; albumen fleshy. Cotyledons large, flat; radicle short, inferior.—Climbing shrubs with tendrils. Branches angular, pubescent when young. Leaves alternate, petiolate, entire; stipules small, deciduous. Peduncles axillary, slender, sometimes changing into simple circinate tendrils. Flowers umbellate, on slender pedicels.

Besides the African species which are endemic, there is one Indian.

Flowers glabrous. Fruit smooth . . . . . 1. *H. ovatus.*
Flowers densely hirsute. Fruit more or less tuberculate . . . . . 2. *H. mystacinus.*

1. **H. ovatus,** *E. Mey.; Harv. et Sond. Fl. Cap.* i. 479. A climbing glaucous shrub with simple spirally twisted tendrils. Branches slender, angular, divaricate, pubescent when young. Leaves petiolate, varying from ovate-oblong to orbicular, 1–2 in. in diam., obtuse or emarginate with a very fine mucro, subcordate or obtuse at the base, entire, glabrous above, when young furnished with a few scattered silky hairs beneath, at length quite glabrous. Stipules linear-subulate, deciduous. Flowers glabrous, in simple axillary or terminal pedunculate umbels about the length of the leaves; pedicels ¼–½ in. long. Fruit glabrous, smooth, obovate or nearly globular, ¼ in. in diam. with a slight central depression.—*Willemetia scandens*, Eckl. et Zeyh. Herb. 996.

Lower Guinea. In thickets, not uncommon, 1000–2400 ft., Golungo Alto, *Dr. Welwitsch!*

Mozamb. Distr. Lower valley of the river Shire, *Dr. Meller!*
Also common in extratropical S. Africa.

2. **H. mystacinus,** *Hemsl.* A climbing shrub with simple, spirally twisted tendrils. Branches slender, angular, divaricate, densely silky pubescent or nearly glabrous. Leaves petiolate, ovate elliptical or oblong, 1½–3 in. long, obtuse, mucronulate, subcordate or obtuse at the base, entire, glabrous above, densely silky-hirsute beneath. Flowers densely, often rusty, hirsute or villous, in simple axillary or terminal umbels, on long peduncles equalling or exceeding the leaves; pedicels at length ¼–½ in. Fruit more or less tuberculate and pubescent, spherical. Calyx-lobes subpersistent.—*H. scandens,* Rich. Fl. Abyss. i. 139. *Rhamnus mystacinus,* Ait.; Hort. Kew. i. 266.

Nile Land. Abyssinia, *Schimper!* and others.

The synonymy of the two species has been misunderstood, Richard having taken *Willemetia scandens* for this species, hence the name he adopted must be suppressed, as it belongs more properly to *H. ovatus.*

8. **LASIODISCUS,** Hook. f.; Benth. et Hook. f. Gen. Pl. i. 381.

Calyx-tube obconical; limb 5-lobed; lobes reflexed, keeled inside. Petals 5, linear-obovate, concave. Stamens 5, inserted below the margin of the disk, equalling the petals; filaments filiform or slightly dilated; anthers small, 2-celled. Disk large, tumid, densely villous, covering the broad top of the ovary, obscurely angled. Ovary 3-celled, half inferior; cells 1-ovulate. Styles 3, short, connate to the middle; stigmas recurved. Fruit not seen.—A suberect shrub with opposite leaves and interpetiolar stipules. Flowers in axillary compound cymes.

The genus is limited to a single species, endemic in W. tropical Africa, and is closely allied to *Nesiota,* differing principally in its half-inferior ovary, recurved calyx-lobes, and large swollen disk covering the top of the ovary.

1. **L. Mannii,** *Hook. f. in Benth. et Hook. f. Gen. Pl.* i. 381. A slender half-climbing shrub, 10–12 ft. high. Branches terete when young, as well as the petioles and flowers, clothed with rigid, ferruginous, strigose hairs. Leaves large, opposite, shortly petiolate, ovate-oblong, acute, very acuminate, narrowed and obliquely subcordate at the base, 6–12 in. long, obtusely serrate, membranous. Stipules free, erect, lanceolate, acute, striate, chartaceous, ½ in. or more in length, deciduous. Flowers large for the Order, in compound, axillary, few-flowered cymes. Peduncles about half as long as the leaves. Bracts 2, at the base of the cyme, large, ovate, acute; bracteoles similar but smaller; pedicels subumbellate.

Upper Guinea. Prince's Island, *Mann!*

Order XLIII. AMPELIDEÆ (by Mr. J. G. Baker).

Flowers regular, hermaphrodite or unisexual. Calyx small, entire or 4–5-toothed. Petals 4–5, valvate, free or often permanently coherent at the edges,

deciduous. Stamens 4–5, opposite the petals, inserted at the base of the disk or between its lobes. Anthers free or connate, short, 2-celled. Disk round or quadrangular, often prominent, free or connate with the petals, stamens, or ovary. Ovary often immersed in the disk, 2–6-celled, the cells with 1 or 2 ovules in each. Style subulate or obsolete; stigma capitate, sublobate. Ovules ascending, anatropal, often adnate to the septum, with a short funiculus. Fruit a watery or firm berry, 1–6-celled, the cells 1–2-seeded. Seeds erect, the testa bony, the endopleure sometimes rugose; albumen cartilaginous, sometimes ruminate. Embryo short, placed at the base of the albumen; cotyledons oval; radicle very short, inferior.—Sarmentose or suberect shrubs with usually a copious watery juice. Stems articulated, rarely bulbous and subterranean in the lower part. Leaves alternate, very rarely opposite, simple or digitate or pedate or pinnate, the base of the petiole articulated, sometimes swollen with a leafy border clasping the stem like a stipule. Inflorescence in our species cymose or thyrsoid. Tendrils mostly copious. Flowers small, often green.

An almost cosmopolitan Order, with its headquarters in tropical Asia; rare in America, very rare in Europe and Polynesia.

Filaments and anthers free . . . . . 1. VITIS.
Filaments united in a tube and anthers cohering by their edges . . . . . 2. LEEA.

1. VITIS, Linn.; Benth. et Hook. f. Gen. Pl. i. 387.

Calyx cyathiform, entire or slightly 4–5-lobed. Petals 4–5, often incurved and cohering permanently at the point, the unexpanded corolla globose or cylindrical. Stamens 4–5, inserted below the edge of the often prominent disk. Anthers free. Ovary globose or ovoid, generally 2-celled, rarely 3- or 4-celled. Style obsolete or subulate. Fruit an ovoid or globose berry, 1- or 2-celled, the cells 1- or 2-seeded.—Shrubs with herbaceous woody or succulent stems, usually sarmentose with copious tendrils, sometimes suberect. Leaves in the African species simple or with 3–7 leaflets, never arranged pinnately. Inflorescence in leaf-opposed or casually terminal stalked cymes or thyrsoid panicles. Flowers usually hermaphrodite, sometimes polygamous.

A large genus, with its headquarters in the tropics of the Old World.

A. Leaves simple.

* *Leaves ovate, not at all lobed.*

Leaves and young shoots glabrous or very nearly so.
Stems woody.
Flowers in simple subsessile cymes . . . . . 1. *V. producta.*
Flowers in short stalked subcorymbose or thyrsoid panicles . . . . . 2. *V. Afzelii.*
Stems herbaceous . . . . . 3. *V. Barteri.*
Leaves and young shoots ferrugineo-tomentose.
Stems woody, suberect, cymes compound . . . . . 4. *V. cornifolia.*
Stems slender, sarmentose, cymes simple . . . . . 5. *V. diffusiflora.*

** *Leaves cordate, not at all lobed.*

†Leaves and young shoots glabrous or very nearly so.

Leaves quite fleshy.
Stems woody, wide-climbing . . . . . 6. *V. Smithiana.*
Stems quite herbaceous . . . . . 7. *V. crassifolia.*
Leaves not fleshy.
Leaves cordate-ovate with short basal lobes.
Leaves entire . . . . . 8. *V. integrifolia.*
Leaves denticulate . . . . . 9. *V. uvifera.*
Leaves rotundate-cordate, the basal lobes deep.
Cymes copiously compound.
Leaves sharply toothed.
Stems subterete . . . . . 10. *V. arguta.*
Stem with 4 broad corky wings . . . . . 11. *V. suberosa.*
Leaves slightly cilinto-denticulate . . . . . 12. *V. glaucophylla.*
Cymes slightly compound.
Stems woody, climbing . . . . . 13. *V. Welwitschii.*
Stems trailing . . . . . 14. *V. pallida.*
†Leaves and young shoots more or less hairy.
Leaves matted on both sides with ferruginous woolly tomentum . . . . . 15. *V. nymphæifolia.*
Leaves matted beneath with salmon-coloured cottony tomentum . . . . . 16. *V. salmonea.*
Leaves densely clothed on both sides with reddish-ferruginous silky hairs . . . . . 17. *V. rubiginosa.*
Leaves clothed beneath with grey pubescence.
Stem farinose, not hairy. Fruit glabrous . . . . . 18. *V. farinosa.*
Stem hairy. Fruit ciliated . . . . . 19. *V. grisea.*

*** *Leaves shallowly lobed.*

Leaves more or less matted beneath.
Petals and stamens five . . . . . 20. *V. Schimperiana.*
Petals and stamens four.
Style nearly obsolete . . . . . 21. *V. ipomæifolia.*
Style subulate . . . . . 22. *V. corylifolia.*
Leaves slightly downy beneath.
Basal lobes deep and teeth irregularly deltoid . . . . 23. *V. asarifolia.*
Basal lobes shallow and edge of leaves finely ciliato-denticulate . . . . . 24. *V. cæsia.*
Leaves quite glabrous on both sides . . . . . 25. *V. abyssinica.*

**** *Leaves deeply lobed.*

Leaves densely matted or pubescent beneath.
Stems woody, suberect. Tendrils few or none.
Petals 4. Style subulate . . . . . 26. *V. palmatifida.*
Petals 5. Style none.
Leaves beneath with spreading grey pubescence . . . 27. *V. mossambicensis.*
Leaves beneath matted with cottony tomentum.
Teeth inconspicuous . . . . . 28. *V. platanifolia.*
Teeth very distinct . . . . . 29. *V. heracleifolia.*
Stems herbaceous, wide-climbing.
Stems stout, clothed with short grey down and purple setæ 30. *V. Leonensis.*
Stems slender, the young shoots densely clothed with pale, reddish-brown, silky tomentum . . . . . 31. *V. bombycina.*
Leaves glabrous or nearly so.
Stems thick, herbaceous, 4-winged . . . . . 32. *V. quadrangularis.*
Stems thick, firm but compressible . . . . . 33. *V. cavicaulis.*
Stems firm, slender, woody.
Buds oblong . . . . . 34. *V. vinifera.*

Buds round . . . . . 35. *V. Grantii.*

B. Leaves compound; leaflets not more than 3.
Stems and leaves very fleshy.
Leaflets sessile, elongate-lanceolate . . . . . 36. *V. jatrophoides.*
Leaflets cordate-oblong, distinctly stalked . . . . . 37. *V. Currori.*
Stems erect, herbaceous. Root tuberous . . . . . 38. *V. juncea.*
Stems woody, subercct . . . . . 39. *V. erythrodes.*
Stems firm, slender, wide-climbing.
Leaflets matted beneath with white cottony tomentum . . . 40. *V. pannosa.*
Leaflets with fine grey pubescence beneath . . . . . 41. *V. ibuensis.*
Leaflets quite glabrous on both sides . . . . . 42. *V. amplexa.*

C. Leaves compound; leaflets 5 or rarely 7.

* *Leaves pedate*, i. e. *the secondary petioles forked.*

Petioles and veins beneath downy . . . . . 43. *V. adenantha.*
Leaves beneath and petioles naked.
Leaflets very nearly entire . . . . . 44. *V. debilis.*
Leaflets distinctly toothed.
Unexpanded corolla globose and style very short.
Leaves very thin; flowers in a small cyme . . . . 45. *V. gracilis.*
Leaves firmly membranous; cyme 4–6 in. broad . . 46. *V. intricata.*
Unexpanded corolla cylindrical and style subulate.
Stem glabrous, herbaceous . . . . . 47. *V. tenuicaulis.*
Stem woody, deciduously setose . . . . . 48. *V. adenocaulis.*

** *Secondary petioles not branched.*

Stem and leaves very fleshy.
Root tuberous; stem subercct, without tendrils . . . . . 49. *V. macropus.*
Leaves fleshy. Stem sarmentose, with tendrils.
Leaves densely and permanently matted all over beneath.
Leaflets distinctly stalked; the terminal one 1–1½ in. long . . . . . 50. *V. crassiuscula.*
Leaflets sessile; the terminal one 6 to 8 in. long.
Stem clothed with fine down.
Clusters bracteated . . . . . 51. *V. chloroleuca.*
Berries very tomentose. Clusters not bracteated . . 52. *V. andongensis.*
Stems densely bristly; berries naked . . . . . 53. *V. pendula.*
Leaves slightly grey-downy beneath.
Leaflets distinctly stalked, narrowed at the base; young petioles finely downy.
Corolla 1 line long . . . . . 54. *V. Thonningii.*
Corolla 2 lines long . . . . . 55. *V. cyphopetala.*
Leaflets on long stalks, cordate at the base, the whole plant clothed with stalked glands . . . . . 56. *V. pruriens.*
Leaflets sessile.
Stem sarmentose; leaves on long stalks . . . . . 57. *V. stipulacea.*
Stem subercct; leaves sessile or nearly so . . . . . 58. *V. stenoloba.*
Leaves glabrous beneath.
Stem naked; leaflets entire . . . . . 59. *V. constricta.*
Stem ciliated; leaflets toothed . . . . . 60. *V. subciliata.*
Leaves not fleshy; stems herbaceous or woody.
Petioles and leaves beneath glabrous when mature.
Stems herbaceous, sarmentose.
Stems deciduously setose.
Fruit globose, naked . . . . . 61. *V. Vogelii.*
Fruit oblong, setose . . . . . 62. *V. cirrhosa.*
Stems glabrous . . . . . 63. *V. paucidentata.*
Stems woody, but slender.

Petals 5; buds oblong.
Inflorescence cymose; leaflets distinctly stalked . . 64. *V. angolensis.*
Inflorescence thyrsoid; leaflets subsessile . . . . 65. *V. multistriata.*
Petals 4; buds cylindrical, constricted.
Inflorescence cymose . . . . . 66. *V. oxyphylla.*
Inflorescence thyrsoid . . . . . 67. *V. bororensis.*
Petals 4; buds oblong, not constricted . . . . . 68. *V. aralioides.*
Petioles and leaves beneath more or less downy and matted.
Stems herbaceous.
Leaflets distinctly stalked.
Leaves sessile . . . . . 69. *V. congesta.*
Leaves stalked . . . . . 70. *V. Mannii.*
Leaflets sessile.
Fruit naked . . . . . 71. *V. serpens.*
Fruit densely glandular . . . . . 72. *V. flavicans.*
Stems terete, quite woody.
Leaflets all distinctly stalked.
Petals and stamens 4; leaves slightly downy . . 73. *V. curvipoda.*
Petals and stamens 5; leaves matted beneath . . 74. *V. concinna.*
Side-leaflets sessile or subsessile; terminal one short-stalked; petals 5.
Leaflets not pinnatifid.
Leaflets faintly toothed . . . . . 75. *V. obtusata.*
Leaflets deeply inciso-dentate . . . . . 76. *V. arcuata.*
Leaflets deeply pinnatifid . . . . . 77. *V. dissecta.*

1. **V. producta,** *Afzel.; DC. Prod.* i. 629. Stem wide-climbing, slender but woody, naked, angular. Petioles naked, $\frac{1}{4}$–$\frac{1}{2}$ in. long. Stipules ovate, membranous. Tendrils slender, firm, branched. Leaves ovate-oblong, 3–4 in. long by less than half as broad; the base rounded; the apex acuminate; the edge slightly and distinctly ciliato-denticulate; texture subcoriaceous, both sides quite glabrous. Flowers in leaf-opposed, subsessile, simple cymes of 9–12 flowers each. Pedicels naked, ultimately $\frac{1}{8}$ in. long. Calyx cyathiform, naked, entire, $\frac{1}{3}$ a line deep. Corolla whitish-red, oblong, a line deep; the 4 petals separating or cohering. Style subulate. Fruit turbinate, naked, black, 3 lines long.

Upper Guinea. Sierra Leone, *Afzelius! Don!* and gathered again, recently, by Dr. Welwitsch.

This description is taken from the original specimens at the British Museum. They have a copious ramified growth of abortive branches, similar to that often seen in the common Birch.

2. **V. Afzelii,** *Baker.* Stem firm, woody, moderately stout, naked. Petioles $\frac{1}{4}$ in. long, naked. Leaves simple, oblong, 4–5 in. long, $1\frac{1}{2}$–$1\frac{3}{4}$ in. broad; the apex acuminate; the base broadly rounded, edge distantly denticulate, both sides glabrous. Tendrils firm, slender, branched. Flowers in short-stalked, subcorymbose or thyrsoid panicles, made up of several cymes of 6–12 flowers each; the ultimate pedicels 2–$2\frac{1}{2}$ lines long, naked or nearly so. Calyx cyathiform, naked, not lobed, about $\frac{1}{2}$ a line broad. Corolla oblong, a line deep; petals 4, coherent; style subulate. Fruit naked, turbinate.

Upper Guinea. Sierra Leone, *Afzelius! Don!*

Closely allied to the preceding, but more robust, the stems thick, but not so strong, and the inflorescence copiously compound. This may be *Cissus denticulata*, Turez. Bull. Mosc.

xxxvi. part 1. p. 591, a Sierra Leone plant, but the description is much too imperfect to enable us to decide with confidence.

2. **V. Barteri,** *Baker.* Stem wide-trailing, herbaceous, deeply striated, not at all hairy. Petioles 1 in. or less long, weak, naked. Tendrils long, slender, not branched. Leaves ovate, 4–5 in. long, 2 in. or more broad, rounded or slightly cordate at the base; the point acuminate; the edge very slightly denticulate; texture membranous or scarcely fleshy, both sides glabrous and smooth. Flowers in lateral slightly compound cymes. Pedicels ¼ in. long, naked. Calyx subcyathiform, 1 line broad, not lobed. Ovary subglobose. Corolla yellowish. Style subulate.

Upper Guinea. Fernando Po, *Barter! Mann!*

In habit of growth and the texture of its stem and leaves, this agrees with *V. pallida* and the Cape *V. fragilis*, but in both the leaves are quite different in shape. It climbs to a height of 15 ft. We have not seen the fruit.

4. **V. cornifolia,** *Baker.* Shoots firm, woody, suberect, densely clothed when young with ferruginous tomentum. Petioles ¼–½ in. long, tomentose when young, naked when mature. Tendrils none on any of our specimens. Leaves ovate, 3–4 in. long, 1½–2 in. broad, rounded at the base; the point acute; the edge very faintly and distantly toothed; texture firm, under surface finely hairy when young, both sides quite glabrous when mature; the veins not prominent. Flowers in lateral compound cymes or terminal panicles, with cymose branches. Primary peduncles strong, 1–3 in. long. Clusters 6–10-flowered; the pedicels ⅛–¼ in. long, more or less villose. Calyx cyathiform, ¾ line broad, entire. Petals 4, 1 line deep, connivent. Stamens 4. Fruit obovoid, ¼ in. long, ¼ in. broad, black, 2-celled, tipped with the persistent style.

Upper Guinea. Nupe, *Barter!*
Nile Land. Madi, *Speke and Grant!* Nubia, *Petherick!*

A low suberect shrub, flowering in November, with eatable fruit, with leaves very like those of *Cornus sanguinea.*

5. **V. diffusiflora,** *Baker.* Stem wide-climbing, zigzag, slender, but firm; the nodes of the upper part about an inch long, densely clothed with short rusty-brown tomentum. Petioles scarcely any. Tendrils none on our specimens. Leaves ovate-oblong, narrowed gradually below to a slightly rounded base, 3–4 in. long by 1½ in. broad; the point acuminate; the edge distantly ciliato-denticulate; texture thickly membranous or subcoriaceous; upper surface glabrous, lower rusty-tomentose on the nerves when young; the veins not prominent. Flowers in simple or 1-forked, 5–7-flowered cymes, opposite each of the leaves. Peduncles ¼–½ in. long, firm, villose. Pedicels ¼ in. long, curved when the plant is in fruit. Calyx reddish-brown, cyathiform, not lobed, 1 line across. Petals 4, red, a line long, connivent. Stamens 4. Style subulate. Fruit turbinate, ¼ in. long, 2-celled.

Upper Guinea. Fernando Po, *Mann!*

A wide-climbing shrub, with shoots 20 ft. long, flowering in November.

6. **V. Smithiana,** *Baker.* Stem woody, wide-climbing, slender, terete,

naked. Petioles 2–3 in. long, firm, slender, glabrous. Leaves rotundate-cordate, 4–6 in. each way, the basal lobes in the large ones an inch deep, the apex acuminate or cuspidate, the edge furnished with conspicuous irregular deltoid teeth, texture fleshy but thin, both sides quite glabrous, colour a bright light green in the living plant, turning brownish-black when dried. Flowers in copiously compound cymes, finally 3–4 in. broad, on spreading, firm, woody peduncles, 1–2 in. long. Bracts fleshy, cordate-ovate. Flowers 6–10 in an umbel, the pedicels at first slightly downy when mature, naked, firm, ¼ in. long. Calyx cyathiform, entire, ½ line broad. Buds oblong, glabrous, Stamens and petals 4. Style subulate, undeveloped fruit naked, turbinate.

Lower Guinea. Congo, *Smith!* Golungo Alto, Angola, *Dr. Welwitsch!*

7. **V. crassifolia,** *Baker.* Stem wide-climbing, weak, herbaceous, quadrangular, naked, fragile, the nodes 1½–2 in. apart. Petioles naked, fleshy-herbaceous, ¼–½ in. long. Tendrils very slender. Leaves cordate, 2–3 in. long, 1½–2 in. broad, the basal lobes rounded but shallow, the point bluntish, the edge conspicuously undulate-crenate, very succulent, both surfaces glabrous; veins immersed, inconspicuous. Flowers in lateral, long-stalked, few-flowered cymes. Peduncles 3–4 in. long, herbaceous, naked. Pedicels ½–¾ in. long, slender, naked. Calyx subcyathiform, not lobed, a line across. Petals 4, greenish, ⅛ in. long, united at the point. Stamens 4. Style subulate, 1 line long. Fruit ovoid, fleshy, 2-celled, each cell 2-seeded.

Mozamb. Distr. Zambesi, between Senna and Lupata, *Dr. Kirk!*

A very distinct and well-marked plant.

8. **V. integrifolia,** *Baker.* Stems wide-climbing, woody, subterete, naked, the nodes of the shoots 1–2 in. long. Petioles 1½–2 in. long, naked, firm, slender. Leaves cordate-ovate, 2–3 in. long, 1½–2 in. broad, from the apex of the petiole to the edge nearly straight and the lower corners nearly rectangular, the sides subparallel for the lower half, then narrowed suddenly, but the point subacute, texture membranous, both sides quite smooth and glabrous, the lower pale green, the veins not raised, the edge not at all toothed, very slightly undulated. Tendrils few, slender. Flowers in few-flowered lateral cymes. Peduncles 1½–2 in. long, firm, naked. Pedicels ¼–¾ in. long, naked. Calyx cyathiform, not lobed, 1 line broad. Petals 4, ⅛ in. deep, cohering firmly at the tips. Style subulate, 1 line long. Fruit bright scarlet, ovoid, fleshy, ¾ in. long, ½ in. broad, sour when ripe, 2-celled; the cells 2-seeded.

Mozamb. Distr. Zambesi-land, Shupanga and between Senna and Lupata, *Dr. Kirk!*

A climbing shrub, flowering in September to December.

9. **V. uvifera,** *Afzel.; DC. Prod.* i. 628. Stem wide-climbing, firm, woody, naked, quadrangular or subterete, the nodes 1–2 in. apart. Petioles 1–2 in. long, slender, firm, naked. Leaves cordate-ovate or cordate-oblong, 3–4 in. long, 2–3 in. broad, the basal lobes rounded, very slightly and sometimes hardly at all produced, the point acute or acuminate, the edge slightly

and distantly toothed, texture subcoriaceous, both surfaces glabrous, the veins beneath not prominent. Tendrils long, copious, firm. Flowers in copious compound lateral cymes. Peduncles $\frac{1}{2}$–$\frac{3}{4}$ in. long, firm, naked. Clusters 6–10-flowered; pedicels $\frac{1}{4}$–$\frac{1}{2}$ in. long, villose. Calyx cyathiform, not lobed, $\frac{3}{4}$ line broad. Petals 4, $\frac{3}{4}$ line long, greenish, cohering at the point. Stamens 4. Style subulate. Fruit globose, about the size of a pea, black when mature, 1-celled, 1-seeded.—*Hook. f. Fl. Nigrit*, 262.

Upper Guinea. Fernando Po, *T. Vogel! Mann!* Eppah, *Barter!*

A wide-climbing shrub, trailing over low bushes, with stems sometimes 30 ft. long, flowering in September.

10. **V. arguta,** *Hook. f. Fl. Nigrit.* 261 (*Cissus*). Stem wide-climbing, much branched, firm, woody, naked, subterete, the nodes about 2 in. apart. Petioles about 1 in. long, slender, glabrous. Leaves cordate-ovate, 3–4 in. long, 2–2$\frac{1}{2}$ in. broad, the basal lobes rounded, $\frac{1}{4}$–$\frac{1}{2}$ in. deep, the broadest part of the leaf two-thirds of the distance from the apex to the base, the point acute or acuminate, the edge sharply but not deeply toothed, the teeth pointing upwards, texture crisp, membranous, both sides green and glabrous, the lower one rather shining. Tendrils long, copious, firm. Flowers in copiously compound lateral cymes. Peduncles $\frac{1}{2}$–$\frac{3}{4}$ in. long, firm, rather hairy. Clusters 6–10-flowered; pedicels $\frac{1}{4}$–$\frac{1}{2}$ in. long, ferrugineo-tomentose. Calyx cyathiform, not lobed, $\frac{3}{4}$ line across. Petals 4, a line long, cohering at the apex. Stamens 4, glandular at the base. Style subulate, nearly as long as the petals.

Upper Guinea. Niger country; Quorra and Ibu, *T. Vogel!*

A copiously-branched, wide-climbing shrub, flowering in August and September. Fruit not known. In habit and the shape and cutting of its leaves, this comes near the E. Indian *V. parviflora*, Roxb.

11. **V. suberosa,** *Welw. mss.* Stems woody, wide-climbing, the main ones with 4 thin corky wings, $\frac{1}{4}$–$\frac{3}{8}$ in. broad, not present on the young branches, which are naked, subquadrangular, almost herbaceous, finely striated. Stipules broadly ovate, rather fleshy. Petioles 1$\frac{1}{2}$–2 in. long, herbaceous, glabrous. Leaflets rotundato-cordate, 3–4 in. each way, the point acuminate, the margin conspicuously and irregularly inciso-dentate, texture firmly membranous, both sides quite glabrous. Tendrils woody. Flowers in copiously compound irregular cymes, on peduncles 2–4 in. long. Clusters 6–12-flowered, the pedicels $\frac{1}{4}$–$\frac{1}{2}$ in. long, slightly downy. Calyx cyathiform, not lobed, $\frac{1}{2}$ line broad. Corolla a line long. Petals and stamens 4. Style subulate, equalling the petals.

Lower Guinea. Pungo Andongo, Angola, *Dr. Welwitsch!*

Flowers like those of *V. arguta*, and leaves similar in shape but more deeply cut. The stem very peculiar.

12. **V. glaucophylla,** *Hook. f. Fl. Nigrit.* 263 (*Cissus*). Stem wide-climbing, slender, firm, woody, subterete. Petioles 2–3 in. long, firm, naked. Leaves rotundate-cordate, 4–6 in. each way when fully developed, the basal lobes broadly rounded, the point subacute, the edge slightly ciliato-denticulate, texture firmly membranous, both sides glabrous. Tendrils few, slender.

Flowers in copiously compound cymes ultimately 4–6 in. broad, on firm *spreading peduncles, 2–3 in. long.* Flowers 6–12 in an umbel, the pedicels *at first a little downy, ultimately* ¼ in. long. Calyx cyathiform, not lobed, *glabrous or nearly so,* ½ *line broad.* Buds ovoid, naked, under a line deep. *Stamens and petals 4, the latter pale, with a red tinge.* Style subulate, *undeveloped; fruit oblong-lanceolate, naked.*

Upper Guinea. Fernando Po, *T. Vogel!* banks of the Niger, at Eppah, *Barter!* Camaroons mountain, *Mann!*

13. **V. Welwitschii,** *Baker.* A wide-climbing shrub, with copiously branched, naked, woody stems. Petioles 2–3 in. long, naked, slender. Leaves broadly ovate-cordate, 4–5 in. long, 3–3½ in. broad, the apex acute, the edge denticulate, both sides glabrous, texture succulent and considerably fleshy, colour light green when recent. Flowers in slightly compound cymes of about 6 flowers each, on short woody leaf-opposed peduncles. No tendrils seen. Pedicels naked, ½–¾ in. long ultimately. Calyx cyathiform, naked, subentire. Petals and stamens not seen. Fruit globose, naked, about half an inch long when dry, green when unripe, then reddish, edible.

Lower Guinea. Golungo Alto, Angola, *Dr. Welwitsch!*

Closely allied to *V. pallida*, but more woody and scandent and the leaves different in texture.

14. **V. pallida,** *Wight and Arn. Prod. Fl. Ind.* i. 125. Stem stout, almost woody, naked, finely striated, trailing or slightly climbing. Stipules ovate, scariose, deciduous. Petioles 2–3 in. long, slightly downy when young, naked when mature. Leaves rotundate-cordate, 4–8 in. each way, the basal lobes rounded, ½–¾ in. deep, with an open sinus, the point bluntish or cuspidate, the edge faintly and distantly denticulate, texture papyraceous or membranous, both sides quite glabrous when mature. No tendrils seen. Flowers in slightly compound, 6–12-flowered, leaf-opposed cymes, on short woody peduncles. Ultimate pedicels ½ in. long in fruit. Calyx cyathiform, glabrous, entire. Petals and stamens 4, the former short, nearly white, cohering. Fruit obovate, under ½ in. long, naked, slightly pointed.—*Cissus populnea*, Guill. et Perr. Fl. Seneg. 134. *Cissus petiolata*, A. Rich. Fl. Abyss. i. 109; Hook. f. Fl. Nigrit. 262.

Upper Guinea. Senegambia, *Leprieur! Perrottet!* Niger country, *T. Vogel!*
Lower Guinea. Pungo Andongo, Angola, *Dr. Welwitsch!*
Nile Land. Gallabat, *Schweinfurth!* mountains of Abyssinia, *Schimper! Dillon!*

A common Asiatic species.

A plant gathered by Barter at Nupe may be the same, but the inflorescence is more compound, and the fruit considerably larger (the size of a Muscat grape).

15. **V. nymphæifolia,** *Welw. mss.* Stems 3–4 ft. high, stout, suberect, sparingly branched, woody below, almost herbaceous upwards, densely clothed, when young, with short brown pubescence. Petioles 1½–2 in. long, firm, suberect, clothed like the young stems. Leaves rotundate-cordate, measuring 6–8 in. each way when fully mature, the basal lobes 1·2 in. deep, with a narrow sinus, the edge slightly repand and finely but sharply ciliato-denticulate, texture membranous, both sides pale green, thinly matted

all over with brown woolly tomentum. Tendrils 0. Flowers in moderately compound, leaf-opposed cymes, on almost herbaceous peduncles, ¾–1½ in. long. Ultimate pedicels ¼–⅜ in. long, ferruginous, like the leaves when young. Calyx ½ line broad, pale, cyathiform, quite entire, slightly ferruginous. Petals and stamens 4, the corolla oblong, cream-coloured, with a tinge of red, quite a line deep, slightly ferruginous on the outside. Style subulate, as long as the stamens. Immature berry ¼ in. each way, round, green, quite naked.

Lower Guinea. Huilla, Angola, *Dr. Welwitsch!*

In leaves and fruit this resembles the preceding, but the stem is erect, the cymes more compound, and the whole plant thinly matted with brownish down.

16. **V. salmonea,** *Baker.* Stems wide-climbing, herbaceous but firm, compressible, dark coloured, copiously clothed with fine grey down and spreading purplish setæ. Petioles 1½–2 in. long, thick, herbaceous, clothed like the stem. Leaves rotundate-cordate, 3–4 in. each way, the basal lobes rounded, ½–¾ in. deep, the apex acute or cuspidate, the edge closely furnished with spreading, not deep, triangular mucronate teeth, texture membranous; upper surface nearly glabrous, lower densely matted all over with fine bright salmon-coloured down, the veins reddish-brown. Tendrils long, copious, firm, often branched. Flowers in dense compound lateral cymes or panicles. Peduncles strong, spreading, villose, about 1 in. long. Branches generally racemose; pedicels very short, villose. Calyx cyathiform, not lobed, ½ line broad. Petals 5, ½ line long. Stamens 5. Ovary pentagonal, the stigma sessile. Fruit not seen.

Upper Guinea. Sierra Leone, *Afzelius! Barter! Dr. Welwitsch!*

A wide-climbing shrub. In the clothing of the leaves and their shape this agrees with the Indian *V. lanata,* Roxb., but in the latter the panicle is thyrsiform and the stems are not setose.

17. **V. rubiginosa,** *Welw. mss.* Suffruticose; stem wide-climbing, slender, terete, densely matted with short, reddish-ferruginous silky hairs. Petioles 2–4 in. long, firm, slender, matted like the branches. Leaves rotundate-cordate, 3–5 in. each way, the basal lobes 1 in. deep, the apex with a very slight point, the edge with each of the main veins produced a little beyond it, texture thinly membranous, both sides, especially the lower one, matted with bright coloured tomentum like that of the branches, which is dense on the main veins below. Flowers in copiously compound cymes, on short erecto-patent leaf-opposed peduncles. Ultimate pedicels ⅛–¼ in. long, together with the cyathiform entire calyx and the 4 ovate-lanceolate petals ferruginous on the outside. Petals soon spreading, the expanded corolla 2 lines broad. Style subulate. Immature fruit naked, subglobose.

Lower Guinea. Golungo Alto and Pungo Andongo, Angola, *Dr. Welwitsch!*

This coincides with the Cape *V. capensis* in the character of the inflorescence, but the ferruginous coating of the leaves is denser and more permanent, and their toothing and veining very different.

18. **V. farinosa,** *Welw. mss.* Stem wide-climbing, rather woody, terete, finely striated, densely clothed with white pulverulent meal when young.

Petioles 2–3 in. long, firm, glabrous, pulverulent like the branches. Leaves rotundate-cordate, 4–6 in. across each way, the basal lobes 1 in. or more deep, the point cuspidate, the edge faintly ciliato-denticulate, texture firmly membranous; upper surface, when mature, glabrous, lower densely coated all over with short greyish-brown tomentum. Flowers in copiously compound cymes on firm woody peduncles, 2–3 in. long. Clusters 6–8-flowered, the pedicels firm, 3–4 lines long, slightly downy when young. Calyx ½ line broad, not lobed, brown, scarious, downy. Buds ovoid, downy, under 1 line long. Petals and stamens 4, the former cohering. Style subulate. Immature fruit ovoid, naked.

Lower Guinea. Golungo Alto and Cazengo, Angola, *Dr. Welwitsch!*

19. **V. grisea,** *Baker.* Stems wide-climbing, woody, striated, densely clothed with short grey pubescence. Petioles ½–1 in. long, firm, villose. Leaves rotundate-cordate, 4–6 in. across each way, the basal lobes rounded, ¼–¾ in. deep, the broadest part of the leaf two-thirds of the distance from the point to the base, the point acute, the edge conspicuously ciliato-denticulate with spreading teeth, texture flaccid, membranous; upper surface dull green, naked, lower covered all over, especially on the veins, with short, stiff, spreading hairs. Tendrils none in our specimens. Flowers in slightly compound lateral cymes. Peduncles 1 in. or more long, firm, villose. Pedicels ½–¾ in. long, villose. Calyx cyathiform, not lobed, 1 line broad. Fruit fleshy, obovoid, ½ in. deep by rather less broad, densely shaggy, with thick soft hairs, containing only one large bony seed.

Mozamb. Distr. Banks of the Shire, Zambesi-land, *Dr. Kirk!*

20. **V. Schimperiana,** *Hochst.; Rich. Fl. Abyss.* i. 112. Stem strong, woody, terete, sarmentose, matted with cottony tomentum when young. Petioles 2–6 in. long, matted and sometimes furnished with purple, gland-tipped hairs. Leaves rotundate-cordate, attaining a breadth of 12 or 15 in., the basal lobes broadly rounded, sometimes 2 in. deep, the upper part with 3 shallow deltoid lobes, the edge all round with irregular, shallow, deltoid teeth; texture membranous, the upper surface slightly downy when young, glabrous when mature, the lower thinly matted with greyish or slightly salmon-coloured, cottony tomentum. Flowers in short-stalked, dense, cymose or thyrsoid clusters. Pedicels very short. Calyx a line broad, scarious, glabrous, distinctly 5-lobed. Buds roundish, naked. Petals 5, bright red. Stamens 5. Stigma peltate, sessile. Fruit oblong, watery, edible, ¾–1 in. long.

Upper Guinea. Niger country, Loin and Yomba, *Barter!*
Nile Land. Gallabat, *Schweinfurth!* Abyssinia, *Schimper!*
Lower Guinea. Angola, *Dr. Welwitsch!*

Closely allied to the E. Indian *V. rugosa*, Wallich. "Fruit like that of the Frontignac grape," *Barter.* It has the largest leaves of any of the tropical African species.

21. **V. ipomœifolia,** *Webb, Frag. Fl. Æthiop.* 57 (*Cissus*). Stem robust, sarmentose, striated, floccose-tomentose. Leaves long-stalked, large, cordate, acute, the edge sinuated with short, thick, acute teeth, upper surface soft, lower villose-araneose. Tendrils none in the specimens. Flowers in leaf-opposed, stalked, white, woolly cymes. Flowers crowded, ovate, subacute, very shortly stalked. Calyx short, thin, scarious, villose, with 4 crenu-

late lobes. Petals purplish, subpuberulous, cohering. Stamens purplish, glabrous. Ovary glabrous, striated, dark purple. Style nearly obsolete. Fruit not seen.

Nile Land. Nubia, *Figari.*

This we have not seen.

22. **V. corylifolia,** *Baker.* Stems suberect, firmly herbaceous, densely clothed with fine grey hairs. Petioles 1–1½ in. long, stout, herbaceous, densely villose. Leaves rotundate-cordate, attaining 6–8 in. each way, the basal lobes rounded, ½–¾ in. deep, the broadest part about halfway between the apex and the base, the upper half slightly lobed on each side, the point bluntish, the edge all round slightly toothed with irregular, shallow, spreading, mucronate teeth, texture membranous, upper surface glabrous, lower densely clothed all over when young, upon the veins principally when mature, with stiff, spreading, grey hairs. Flowers in compound cymes. Peduncles 1–4 in. long, villose. Pedicels, when the plant is in fruit, slender, naked, ¼–⅜ in. long. Calyx cyathiform, villose, ½ line broad, not lobed. Petals 4, connivent at the point, villose, ciliated. Stamens 4. Style subulate. Fruit roundish or subturbinate, ¼ in. deep, whitish when ripe.

Upper Guinea. Niger country, Nupe, *Barter!*

Scarcely more than herbaceous, attaining a height of about a yard.

23. **V. asarifolia,** *Baker.* Stem wide-climbing, slender but firm, naked, subterete, striated, rough, with raised points. Petioles 1–2 in. long, firm, slender, nearly naked. Leaves rotundate-cordate, 2–4 in. each way, the basal lobes rounded, ½–¾ in., the sinus deeply rounded, the edge furnished with decided, spreading, irregular, triangular teeth, the point bluntish, very slightly lobed about one-third of the distance from the apex to the base, texture membranous, both surfaces green, glabrous or the underside slightly pubescent upon the principal nerves when young. Tendrils firm, slender, copious. Flowers in slightly compound lateral cymes. Peduncles firm, spreading, naked, ½–1 in. long. Ultimate pedicels very short. Calyx cyathiform, ½ line across, distinctly 4-lobed. Petals 4, very short, connivent at the point. Stamens 4. Fruit globose, about the size of a pea.

Nile Land. Banks of the White Nile, *Petherick!*

Mozamb. Distr. Zanzibar, *Bojer!* Banks of the Rovuma river, 20 miles from the coast, *Dr. Meller!*

24. **V. cæsia,** *Afzel.*; *DC. Prod.* i. 628 (*Cissus*). Stem wide-climbing, firm, woody, glabrous, terete, with a deciduous glaucous bloom. Petioles ½–1 in. long, firm, slightly pubescent. Leaves subrotundate-cordate, 3–6 in. long by rather less broad, the basal lobes rounded, ¼ in. deep, the point bluntish, the edge slightly bluntly lobed and ciliato-denticulate, texture membranous or when mature subcoriaceous, upper surface naked or nearly so, the lower cæsio-glaucous, principally pubescent on the prominent reddish-brown nerves. Tendrils copious, firm, often branched. Flowers in copiously compound cymes on firm woody peduncles, 2–3 in. long. Umbels 6–8-flowered; pedicels 1½–2 lines long, more or less pubescent. Calyx cyathiform, pubescent, ¾ line across, not lobed. Petals 4, a line long, united at the point.

Stamens 4. Style subulate. Fruit turbinate, naked, ¼ in. deep, black when ripe.—Fl. Nigrit. 261. *Cissus rufescens*, Guill. et Perr. Fl. Seneg. 133.

Upper Guinea. Senegambia, *Heudelot! Perrottet! Skues!* Niger country, *Barter!* Sierra Leone, *Afzelius! Morson! Don!* etc.

Laying the original specimens of the plants of Afzelius and the "Flora of Senegambia," which are both in the British Museum herbarium, side by side, we have no hesitation in uniting the two.

25. **V. abyssinica,** *Hochst.; Rich. Fl. Abyss.* i. 112. Stems wide-climbing, woody, naked. Petioles glabrous, 3–4 in. long. Leaves rotundato-cordate in general outline, 6–9 in. each way, 3-lobed in the upper part about a quarter of the way down to the base, the central lobe deltoid, the base deeply cordate, the edge not more than ciliate-denticulate, texture thinly membranous, both sides quite naked. Flowers in copious thyrsoid panicles on short firm peduncles; pedicels glabrous, very short. Calyx glabrous, cyathiform, loose, under ½ line broad. Unexpanded corolla subglobose. Petals 5, green, glabrous, ½ line long. Stamens 5, with short filaments. Ovary globose with a sessile stigma. Fruit not seen.

Nile Land. Nubia, *Schweinfurth!* Abyssinia, *Schimper!*

Very near *V. vinifera*, but flowers globose and leaves very large, thin, quite glabrous, 3-lobed only in the upper third and edge only ciliate-denticulate.

26. **V. palmatifida,** *Baker.* Stem suberect, woody, terete, finely striated, villose when young, glabrous when mature. Petioles 1–2 in. long, firm, villose. Leaves 2–4 in. each way, 3–5-lobed, the base truncate or slightly cordate, often cut two-thirds or three-quarters of the way down from the edge to the apex of the petiole and terminal lobe especially deeply pinnatifid with oblong segments and broad rounded sinuses, the edge slightly ciliate-denticulate, texture thickly membranous, upper surface green, finely villose, the lower densely matted all over with fine grey pubescence. Tendrils few, firm. Flowers in more or less compound lateral cymes. Peduncles 1–2 in. long, firm, villose. Clusters 6–12-flowered; pedicels ⅛–¼ in. long, pubescent. Calyx cyathiform, not lobed, ½ line broad. Petals 4, ¾ line long, glandulose-pubescent, cohering at the tip. Stamens 4. Ovary subglobose; the style subulate. Fruit subglobose, ¼ in. each way.

Upper Guinea. Niger country, Nupe, *Barter!* and either the same or a closely allied plant gathered by Dr. Welwitsch in Angola.

A suberect shrub, about 6 ft. in height, with eatable fruit like black currants.

27. **V. mossambicensis,** *Klotzsch in Peters' Mossamb. Bot.* 180. Stem wide-climbing, woody, slender, subterete, the young shoots densely pubescent. Petioles of the upper leaves 1–2 in. long, firm, densely pubescent. Leaves rotundate-cordate, 2–6 in. each way, varying from nearly entire to deeply 3- or 5-lobed, the base broadly and deeply rounded, the terminal lobe spathulate with broad rounded sinuses on each side of it, the edge all round furnished with irregular, spreading, shallow, triangular, mucronate teeth, texture coriaceous, both surfaces densely clothed with grey woolly tomentum when young but the upper becoming nearly glabrous in the mature plant. Tendrils few, firm. Flowers in densely compound lateral cymes; peduncles ½–1 in. long, spreading, firm. Clusters dense, with 12–20

flowers in each, the pedicels very short, pubescent. Calyx cyathiform, not lobed, ½ line broad. Petals 5, bright red, ½ line long, ultimately spreading, the expanded flower ⅛ in. across. Stamens 5, half as long as the petals; stigma sessile. Fruit globose, about ¼ in. broad, 2-celled, each cell 2-seeded.

Mozamb. Distr. Mozambique, *Peters!* Zambesi-land, Tette, Shupanga; Moramballa! *Dr. Kirk!*

A wide-climbing shrub with leaves of very woolly texture, the upper ones often nearly entire, the lower ones deeply lobed, and eatable black berries about the size of a pea. In habit and the cutting and clothing of the leaves, this agrees with the Indian *V. Linnæi*, Wall.

28. **V. platanifolia,** *Baker.* Stem suberect, woody, stout, 2–4 ft. high, webbed when young with white cottony tomentum. Bracts large, membranous. Petioles 1–1½ in. long, stout, erecto-patent, firm, webbed like the branches. Leaves rotundate-cordate in general outline, 6–8 in. each way when fully developed, the basal lobes not very deep, the upper part with 3 deltoid lobes which reach a quarter or halfway down or are sometimes deeper and the middle one oblong-spathulate, the apex acute, the edge inconspicuously and irregularly inciso-dentate, texture firmly membranous, upper surface thinly, lower densely matted all over with grey or slightly salmon-coloured, cottony tomentum. Tendrils none. Flowers in dense, considerably compound cymes on short woody peduncles; pedicels very short. Calyx and corolla as in *V. heracleifolia.*

Lower Guinea. Huilla, Angola, *Dr. Welwitsch!*

This may be a variety of *V. Schimperiana* with more deeply lobed leaves.

29. **V. heracleifolia,** *Welw. mss.* Stems robust, suberect, woody, finely grey-downy when young. Bracts large, oblong, membranous. Petioles 1–1½ in. long, stout, firm, grey-downy. Leaves rotundate-cordate in general outline, 4–6 in. each way, palmately 5-lobed to a depth varying from a quarter to quite down to the base, the 3 central lobes oblong-spathulate, the basal lobes shallow, the point blunt, the edge all round sharply, not deeply inciso-dentate, texture firmly membranous, upper surface nearly or quite glabrous when mature, lower matted all over with white, appressed, cottony tomentum. Tendrils none in the specimens. Flowers in close, nearly simple, dense cymes on peduncles under an inch long; pedicels very short. Calyx nearly a line broad, cyathiform, distinctly 5-lobed, webbed with grey cottony tomentum. Buds globose, naked. Petals 5, crimson. Stamens 5. Style obsolete. Fruit not seen.

Lower Guinea. Pungo Andongo, Angola, *Dr. Welwitsch!*

See remarks under *V. dissecta.*

30. **V. Leonensis,** *Hook. f. Fl. Nigrit.* 264 (*Cissus*). Stem wide-climbing, stout but subherbaceous with a large hollow in the centre, terete, finely striated, clothed with short grey down and fine, spreading, purple setæ. Petioles 4–6 in. long, firm, clothed like the stem. Leaves rotundate-cordate in general outline, 6–9 in. broad, 5-lobed from one- to two-thirds of the way down, the base deeply cordate, the terminal lobe broad-spathulate, the sinuses rounded but very narrow, the edge slightly denticulate, texture membranous, upper surface slightly downy when young, glabrous when ma-

ture, the lower matted all over with fine greyish or salmon-coloured, cottony tomentum. Tendrils long, firm, woody, branched. Flowers in densely compound subcymose or paniculate lateral clusters, 2–4 in. broad; peduncles ½–1½ in. long, spreading, firm, villose like the stem. Pedicels very short, villose. Calyx cyathiform, not lobed, ½ line broad. Petals 5, scarlet, spreading, the expanded flower 2 lines across. Stamens 5. Ovary pentagonal, the stigma sessile. Berries subglobose, ⅜ in. long, red, naked.

Upper Guinea. Sierra Leone, *Vogel! Dr. Welwitsch!* Niger country, Nupe, *Barter!* banks of the Bagroo river, *Mann!*

A large climber with eatable fruit.

31. **V. bombycina,** *Baker.* Stem wide-climbing, weak, herbaceous, the young shoots densely clothed with pale, reddish-brown, silky tomentum. Petioles 1–3 in. long, spreading, slender, clothed like the shoots. Leaves rotundate-cordate in general outline, 4–6 in. broad each way, the base broadly rounded, the blade 3–5-lobed two-thirds of the way down, the sinuses rounded, the terminal lobe spathulate entire, the edge distinctly not deeply denticulate, texture thinly herbaceous, upper surface green, glabrous in the mature plant, lower matted all over with fine whitish pubescence which in the young leaves is very dense and has a tinge of salmon-colour. Flowers in compound lateral cymes. Peduncles spreading, ¾–1½ in. long, firm, densely villose. Clusters dense; pedicels very short. Calyx cyathiform, bluntly 5-lobed, ½ line across. Petals 5, deep red, ½ line long. Stamens 5. Ovary pentagonal, prominent, the stigma sessile.

Upper Guinea. Niger country, Nupe, *Barter!*

A wide-climbing plant, scarcely shrubby, with eatable fruit. It agrees with the Japanese *V. Thunbergii*, S. and Z., in the clothing and shape of the leaves, but the inflorescence is quite different.

32. **V. quadrangularis,** ~~*Linn.; DC. Prod.*~~ i. 628. Stem thick, wide-climbing, herbaceous, quadrangular, constricted at the nodes, the angles winged, naked or slightly downy except that the wings when young are sometimes furnished with short, rigid, purple cilia. Petioles ½–1½ in. long, succulent, glabrous. Leaves varying from ovate and entire to cordate and deeply 3-lobed, the terminal lobe triangular or subspathulate, sometimes slightly lobed again, the sinuses rounded and open, the lateral lobes broadly rounded on the lower side, all distantly but rather sharply denticulate, texture membranous, both sides green and glabrous or nearly so. Flowers in slightly compound lateral cymes. Peduncles ½–1 in. long, spreading, herbaceous, glabrous; pedicels ⅛–¼ in. long, herbaceous, glabrous. Calyx cyathiform, 1 line broad, green, not lobed. Petals 4, greenish. Stamens 4, the filaments very short. Berries subglobose, ¼–⅜ in. each way, red when mature, 1-seeded. Style subulate.—Wight, Ic. i. t. 51; Guill. et Perr. Fl. Seneg. i. 133. *C. tetraptera*, Hook. f. Fl. Nigrit. 263. *C. triandra* and *C. bifida*, Schum. et Thonn. Guin. Pl. 81.

Upper Guinea. Senegambia, *Perrottet!* Niger country, *Barter! Curror!*

Nile Land. Nubia, *Schweinfurth!* Abyssinia, *Dillon and Petit! Speke and Grant!*

Lower Guinea. Angola, *Dr. Welwitsch!*

Mozamb. Distr. Zambesi-land, *Dr. Kirk!*

A wide-climbing shrub trailing over trees and bushes, and in Senegambia growing upon the nests of the Termites; easily recognized by its deeply-lobed leaves and thick, herbaceous, tetrapterous stems, constricted at the nodes. The fruit is eatable. It is also a plant of Arabia, India, and the Moluccas.

33. **V. cavicaulis,** *Baker.* Stem wide-climbing, ½ in. thick but hollow in the centre and compressible, striated, naked. Petioles 4–6 in. long, firm, glabrous. Leaves often measuring 1 foot each way, with 5 principal lobes which reach two-thirds or three-quarters of the way down, the central one spathulate, the others unequal-sided and again deeply lobed, the edge of all broadly and not deeply toothed, texture membranous, both sides glabrous, the veins not prominent. Tendrils long, firm. Panicle thyrsiform, the ultimate branches racemose; pedicels very short, slightly pubescent. Calyx cyathiform, not lobed, scarcely more than ⅓–½ line broad. Petals 5, deep red, ½ line long. Stamens 5.

Upper Guinea. Gaboon river, *Mann!*

A wide-climbing shrub with thick, firm, herbaceous stems like those of a *Heracleum*, very large, deeply-lobed leaves and very small, deep red flowers. Fruit not known.

*34. **V. vinifera,** *Linn.; DC. Prod.* i. 633. Stem wide-climbing, firm, naked. Leaves rotundate-cordate in general outline, deeply 5-lobed, irregularly and deeply, often doubly toothed, texture membranous, upper surface glabrous, lower often slightly matted with white cottony down. Flowers in copious thyrsoid panicles; pedicels ⅛ in. long, slender. Calyx under ½ line across, not lobed. Unexpanded corolla oblong, 1 line long. Petals 5. Stamens 5. Ovary flask-shaped, the stigma sessile.

Cultivated in Abyssinia and Angola.

35. **V. Grantii,** *Baker.* Stem wide-climbing, slender, firm, naked. Petioles 1–2 in. long, slender, firm, glabrous, slightly tomentose when young. Leaves rotundate-cordate in general outline, deeply 5-lobed, 3–5 in. broad each way when the plant is in flower, the basal lobes rounded, ½–¾ in. deep, the terminal one spathulate, the rounded sinuses on both sides of it reaching halfway down the leaf, the edge all rounded, furnished with irregular, triangular, mucronate teeth, texture membranous, the upper surface full green and glabrous, the lower paler green and shining when mature, slightly pubescent on the veins in the young plant. Tendrils slender, copiously branched. Flowers in lateral subcymose panicles. Peduncle 1 in. or more long, firm, naked; pedicels very short, pubescent. Calyx loosely cyathiform, ¼ line across, membranous towards the border, bluntly 5-lobed. Unexpanded corolla subglobose. Petals 5, ½ line long. Stamens 5. Ovary roundish, 2-celled, each cell 1-ovulate; stigma sessile.

Nile Land. Usui slopes, lat. 2° 42′ S., *Speke and Grant!*

A wide-climbing shrub very closely allied to *V. vinifera*, from which it differs mainly by its more finely-toothed leaves, less copiously-flowered, subcymose flower-clusters, and subglobose unexpanded corolla.

36. **V. jatrophoides,** *Welw. mss.* Root thick, fleshy, perennial. Stem

2–3 ft. high, herbaceous, erect, swollen at the nodes, glabrous, finely striated, when living rose-purple with a glaucous bloom and an almost glassy translucence. Stipules 1 in. long, lanceolate-acuminate, fleshy, deciduous. Petioles 0 or very short. Leaves digitately 3-foliolate, the leaflets subequal, oblanceolate or oblong-lanceolate, 4–8 in. long, 1–3 in. broad, the point acute, the edge sharply but not deeply ciliate-denticulate, the base narrowed into a long entire haft, texture considerably succulent, both sides quite glabrous, colour when living a subglaucous green, when dry turning nearly black. Flowers in copiously compound, long-stalked, terminal cymes, 6–9 in. broad, with 3–5 long-stalked primary divisions; ultimate pedicels slender, glabrous, $\frac{1}{8}$–$\frac{1}{4}$ in. long. Calyx succulent, cyathiform, naked, not lobed, $\frac{1}{3}$–$\frac{1}{2}$ line broad. Petals and stamens 4, the corolla greenish, nearly 1 line deep, prominently constricted downwards, glabrous on the outside. Style subulate, equalling the stamens. Berry turbinate, firm, purplish-green, $\frac{1}{4}$–$\frac{3}{8}$ in. long, naked.

Upper Guinea. Niger, *Barter!*
Lower Guinea. Ambaca, Angola, *Dr. Welwitsch!*
Mozamb. Distr. Mambane, *Dr. Kirk!*

An exceedingly distinct and well-marked species, the leaves when dried resembling a good deal a branch of *Fucus serratus*.

37. **V. Currori,** *Hook. f. Fl. Nigrit.* 265 (*Cissus*). Stem very succulent, much branched, glabrous, $\frac{1}{2}$ in. thick. Petioles 2–3 in. long, $\frac{1}{4}$ in. thick, glabrous and succulent like the stem. Leaves with 3 much-imbricated leaflets, the terminal one 6–8 in. long, 4 in. broad, cordate-oblong, the point obtuse, the edge with broad, blunt, irregular crenations to a depth of 1 line, the base much rounded, the petiolule $\frac{1}{2}$ in. long, the lateral ones nearly as large, subsessile, texture succulent but not very thick, not pubescent but all over minutely punctate. Flowers in copiously compound cymes, 4–5 in. broad. Peduncles 3–4 in. long, thick, succulent. Calyx 1 line broad, cyathiform, naked, not lobed. Corolla pale, $\frac{1}{8}$ in. deep. Petals and stamens 4. Styles as long as the petals. Ovary glabrous, subturbinate.

Lower Guinea. Elephants' Bay, *Dr. Curror!*
"A very succulent and much-branched tree," *Curror.*

38. **V. juncea,** *Webb, Frag. Fl. Æthiop.* 57 (*Cissus*). Root tuberous, scaly. Stem erect, herbaceous, culmiform, striated, glabrous, leafless below, stipulate at the nodes, the stipules scarious, subcoriaceous, acute, glabrous, ciliated. Leaves quite sessile, with 3 subequal, oblong-lanceolate leaflets, which at the time of flowering are 6–7 in. long by about 1 in. broad, narrowed very gradually from the middle to both ends, the edge inciso-crenate, texture membranous, both sides quite glabrous. Flowers in lax, long-stalked, terminal cymes, 3–4 in. broad; pedicels 1–2 lines long, slender, setose. Calyx $\frac{1}{3}$ line broad, cyathiform, not lobed. Corolla green, subglobose. Petals 4. Stamens 4. Style subulate. Ovary short, glabrous. Fruit not seen.

Nile Land. Nubia, *Figari;* Gallabat, *Schweinfurth!*

39. **V. erythrodes,** *Fresen. in Mus. Senck.* ii. 284. Stem quite woody, suberect, terete, rugose, glabrous, but the young shoots finely grey- or slightly ferruginous-pubescent. Petioles $\frac{3}{4}$–$1\frac{1}{2}$ in. long, firm, spreading, pubescent

like the shoots. Tendrils few, firm, glabrous. Leaves constantly with only 3 leaflets, the terminal one obovate-cuneate, 2–3 in. long, 1–1½ in. broad, the apex cuspidate or blunt, the edge distantly not deeply inciso-crenate, the lower half cuneate, subentire, the petiolule ¼–⅜ in. long, the lateral ones spreading, subsessile, often broadly rounded on the lower side, texture subcoriaceous, upper surface deep green, glabrous, lower clothed with fine grey pubescence. Flowers in small lateral cymes. Peduncles firm, villose, not more than ¼–½ in. long; pedicels ⅛ in. long, firm, villose. Calyx ⅛ in. broad, villose, grey, cyathiform, scarcely lobed. Petals 5, scarlet, ovate-acuminate, about 1 line broad and long, ultimately spreading or even deflexed. Stamens 5, equalling the subulate style and petals. Fruit globose, ½ in. each way, 2-celled, each cell 1–2-seeded.—A. Rich. Fl. Abyss. i. 113.

Nile Land. Abyssinia, *Schimper! Roth! Dillon and Petit!*
Lower Guinea. Pungo Andongo, Angola, *Dr. Welwitsch!*
Mozamb. Distr. Zambesi-land, near Moramballa, at 3500 ft., *Dr. Kirk!*

Var. *β. ferruginea.* Stem and leaf beneath more silky and the pubescence bright-ferruginous; leaflets larger.

Lower Guinea. Huilla, Angola, *Dr. Welwitsch!*

Very near the Cape *C. cuneifolia*, E. and Z., from which it differs principally by the pubescence of the lower side of the leaves.

40. **V. pannosa,** *Baker.* Stems firm, wide-climbing, terete, finely striated, thinly clothed with fine purplish setæ and grey pubescence. Petioles 1½–2 in. long, firm, clothed like the stem but more densely. Tendrils firm, slightly setose. Leaves with 3 sessile, much-imbricated leaflets, the terminal one broadly ovate, 3–4 in. long, 2½–3 in. broad, the point bluntish, the edge irregularly repand, the base rounded, the lateral ones nearly as large, the lower side cordate, texture thin, upper surface green with very fine grey pubescence, the lower densely matted all over with white cottony tomentum. Inflorescence a subcymose panicle, 3–4 in. broad. Peduncle 1–2 in. long, firm, pubescent, and setose; pedicels 1 line or less long, villose. Calyx ½ line broad, cyathiform, not lobed, villose. Corolla 1 line deep, villose. Petals and stamens 4. Style nearly equalling the corolla. Young fruit pendulous, ovoid, densely villose.

Nile Land. Abyssinia, *Schimper!*

41. **V. Ibuensis,** *Hook. f. Fl. Nigrit.* 265 (*Cissus*). Stems slender but firm, very wide-climbing, angular, deeply striated, tomentose when young, becoming glabrous when mature. Petioles ½–1 in. long, slender but firm, pubescent. Tendrils copious, firm. Leaves with 3 leaflets, the terminal one ovate or oblong, 2–3 in. long, about 1 in. broad, the apex pointed, the edge furnished with shallow but sharp distant teeth, the base rounded, the petiolule ½–¾ in. long, the lateral ones similar, spreading, not imbricated, texture membranous, both sides covered with fine grey tomentum when young, becoming glabrous when mature. Flowers in copiously compound cymes, 1½–2 in. broad. Peduncles 4–6 in. long, firm, slender, erect, pubescent. Pedicels 1 line long, pubescent. Calyx cyathiform, pubescent, not lobed, ½ line broad. Corolla subglobose, greenish. Petals and stamens 4. Disk

conspicuous, nearly 1 line broad, reddish. Style very short. Berries round, glabrous, green, reaching ½ in. each way.

Upper Guinea. Banks of the Niger, *T. Vogel, Barter!*
Mozamb. Distr. Zambesi, between Senna and Lupata, *Dr. Kirk!*
"A climber 12 ft. long."

42. **V. amplexa,** *Baker.* Stem very wide-climbing, firm, slender, angular, not striated. Petioles about 1 in. long, glabrous, firm. Tendrils long, firm, very slender. Leaves with 3 sessile leaflets, the central one oblong or obovate, 1½–2 in. long, ¾ in. broad, the apex pointed, the edge indistinctly dentate, the lower half subcuneate, the 2 lateral ones shorter and more rounded at the base; texture membranous, both sides glabrous. Flowers in lax compound glabrous cymes, 3–4 in. broad. Peduncle 2–3 in. long, firm; pedicels ¼–⅓ in. long, slender, naked. Calyx ⅓ line broad, cyathiform. Corolla not seen. Style short. Berry turbinate, naked or slightly setose, ¼ in. deep when dry.

Mozamb. Distr. Banks of the Rovuma river, *Dr. Kirk!*
Comes very near the E. Indian *V. angustifolia*, Roxb.

43. **V. adenantha,** *Fresen. in Mus. Senck.* ii. 283 (*Cissus*). Stem moderately firm, wide-climbing, copiously branched, terete, deeply striated, finely villose when young. Petioles about ½ in. long, spreading, slender, densely villose. Tendrils copious, finely branched. Leaves with from 4–7 leaflets (in our specimens), all stalked, and when there are 7 the lateral petioles forked again; terminal leaflet oblong-acuminate, cordate or rounded at the base, the edge irregularly but not deeply inciso-crenate, the lateral leaflets smaller, often unequal-sided; texture membranous; upper surface slightly villose, the lower more so, especially on the nerves. Flowers in copiously compound cymes about 2 in. broad. Peduncles spreading, about 2 in. long, villose like the stem; ultimate pedicels ⅛ in. long, glandular and villose. Calyx cyathiform, not lobed, ½ line broad, villose. Corolla cylindrical, constricted, 1 line long, glandular. Petals and stamens 4. Style subulate, ¾ line long. Fruit turbinate, glabrous, ¼ in. long, 2-celled.—*Cissus adenantha*, A. Rich. Fl. Abyss. 110.

Nile Land. Abyssinia, *Schimper!*
Native name *Asserkocha*. One of the most wide-trailing species, flowering in June.

44. **V. debilis,** *Baker.* Stem weak, herbaceous, slender, wide-trailing, glabrous, quadrangular, deeply sulcate. Petioles 2–3 in. long, slender, herbaceous, glabrous. Tendrils long, very slender. Leaves quinate, the secondary petioles slender, glabrous, 1 in. long, the lateral ones branched about the middle, terminal leaflet 2–3 in. long, 1–1½ in. broad, broadly ovate, pointed, the edge entire, the base cuneate, the lateral ones similar, but rather smaller, texture thinly membranous, both sides glabrous. Flowers in copiously compound glabrous cymes, 3–4 in. broad. Peduncles 2–3 in. long, slender, herbaceous. Ultimate pedicels ⅛ in. long, slender. Calyx cyathiform, not lobed, green, under ½ line broad. Petals 4, white. Style not more than ¼ line long. Ovary round, glabrous.

Upper Guinea. Island of St. Thomas, *Dr. Welwitsch!* Fernando Po, *Mann!*

Climbs to a height of 6 ft. and flowers in June. Leaves nearly as thin as those of *V. gracilis* and the stem perhaps the feeblest of all the species.

45. **V. gracilis,** *Guill. et Perr. Fl. Seneg.* i. 134 (*Cissus*). Stem weak, wide-climbing, slender, glabrous, angular, sulcate. Petioles 2–4 in. long, slender, herbaceous, angular, glabrous. Tendrils long and fine. Leaves with 3 or 5 leaflets, the petiolule of the central one 1 in. long, of the lateral ones rather shorter and forked near the apex, terminal leaflet ovate-oblong, 3 5 in. long, 1½–2 in. broad, the point acute, the edge irregularly not deeply inciso-crenate, the base rounded or cordate, the lateral ones smaller, often unequal-sided, the basal pair, when present, often very small, colour shining green, texture thinly membranous, both sides glabrous. Flowers in copiously-branched lax glabrous cymes, 1–4 in. broad. Peduncles 1–4 in. long, slender. Ultimate pedicels ½ line long, slender. Calyx green, cyathiform, ½ line broad. Corolla subglobose. Petals 4, ½ line long. Stamens 4, about half as long as the petals. Style very short. Ovary round, naked, 2-celled, each cell 2-ovulate. Berries globose, glabrous, green, ¼–⅜ in. each way.—*Cissus subdiaphana,* Steud.; A. Rich. Fl. Abyss. i. 110; Walp. Ann. ii. 230. *C. membranacea,* Hook. f. Fl. Nigrit. 266. *C. bigemina,* Harv. Fl. Cap. i. 253.

Upper Guinea. Senegambia, *Perrottet!* Fernando Po, *T. Vogel! Mann!*
Lower Guinea. Congo and Angola, *Dr. Welwitsch!*
Nile Land. Gallabat, *Schweinfurth!* Abyssinia, *Schimper! Dillon!*
Mozamb. Distr. Zambesi, between Tette and Lupata, *Dr. Kirk!*

A widely diffused plant, with thin shining leaves and a very weak stem, flowering in June. Stems 12–15 ft. long, Extends southwards to Natal.

46. **V. intricata,** *Baker.* Stem rather woody, but slender, branched and climbing profusely, glabrous, sulcate. Petioles 1–2 in. long, glabrous. Tendrils copious. Leaves with 3 or 5 leaflets, the axillary petioles, when forked, branching quite at the apex; terminal leaflets ovate-oblong, 2–3 in. long, about 1 in. broad, the apex pointed, the edge sharply but not deeply toothed, the base rounded, the petiolule ½–¾ in. long, the lateral ones similar but smaller, texture firmly membranous, both sides glabrous. Flowers in panicles 4–6 in. broad, composed of several thyrsoid or subcorymbose branches. Pedicels 1–2 lines long, glabrous. Calyx ½ line broad, cyathiform, slightly lobed, glabrous. Corolla green, subglobose. Petals and stamens 4. Style very short. Fruit green, globose, juicy, ¼–½ line each way, with two small bony seeds.

Nile Land. Banks of the White Nile, *Petherick!*

Resembles *V. adenocaulis* in general habit and the shape and texture of the leaves, but the corolla is very different and the lateral petioles fork at the point. "Called *Leaf* by the Arabs."

47. **V. tenuicaulis,** *Hook. f. Fl. Nigrit.* 266 (*Cissus*). Stem weak, wide-climbing, herbaceous, slender, angular, deeply sulcate, only slightly pubescent about the nodes. Petioles 1–2 in. long, spreading, weak, herbaceous, glabrous. Tendrils copious, slender. Leaves, except at the apex of the shoots, with 5 leaflets, the lateral petioles branched above the middle; terminal

leaflet oblong-lanceolate, 1½–2 in. long, ¾–1 in. broad, the point acuminate, the edge sharply but not deeply toothed, the base rounded or even cordate, the petiolule ½–1 in. long, glabrous or slightly pubescent, the lateral ones smaller, often unequal-sided, texture membranous, not very thin, both sides with a few small scattered rather bristly hairs. Flowers in copiously compound lax cymes, 3–4 in. broad. Peduncles 1–2 in. long. Pedicels 1–1½ lines long, slender, finely downy only when young. Calyx ⅓ line broad, naked, cyathiform, not lobed. Corolla cylindrical, 1 line long. Petals and stamens 4. Style subulate, nearly as long as the corolla. Fruit globose, naked, about ¼ in. each way, with two large pyriform seeds.

Upper Guinea. Sierra Leone, *T. Vogel!* Nupe, Niger country, *Barter!*
North Central. Bornu, *E. Vogel!*
Lower Guinea. Angola, in numerous localities, *Dr. Welwitsch!*

"Stems 8 ft. long; underside of leaves glaucous." Very like *V. gracilis* in general habit, but the corolla quite different.

48. **V. adenocaulis,** *Steud. in Rich. Fl. Abyss.* i. 111 (*Cissus*). Stem firm, rather woody, branched and very wide-trailing, angular, striated, clothed with scattered deciduous setæ. Petioles 1–2 in. long, glabrous or slightly setose. Tendrils copious. Leaves with 3, 5, or occasionally 7 leaflets, the axillary petioles forked above the middle, terminal leaflet ovate-oblong, 2–3 in. long, 1⅓–2 in. broad, the apex pointed, the edge inciso-dentate, the base rounded or cordate, the petiolule ¾–1 in. long, the lateral ones similar but smaller, texture firmly membranous, both sides glabrous or slightly pubescent. Flowers in copiously-branched cymes, 1–3 in. broad. Peduncles 1–3 in. long. Pedicels about 1 line long, finely pubescent. Calyx ⅓ line broad, cyathiform, not lobed, finely pubescent. Corolla cylindrical, 1 line long. Petals and stamens 4. Style subulate, nearly as long as the corolla. Fruit black, globose, naked, about ¼ in. broad, 3-seeded in our specimens.—Walp. Ann. ii. 230.

Nile Land. Abyssinia, *Schimper!* Unyoro, *Speke and Grant!* Gallabat, *Schweinfurth!*

49. **V. macropus,** *Welw. in Journ. Linn. Soc.* viii. 77 (*Cissus*). Root consisting of long cylindrical subsimple fibres, the trunk forming a large ovate-conical bulb at the base. Stem 1½–2 ft. high, suberect, very thick and succulent. Branches 6–18 in. long, 2–4 in. thick, covered, like the petioles and leaves, with white arachnoid hairs when young, glabrous when mature. Petioles 2–3 in. long, thick and succulent. Leaves with 3–5 plicate leaflets, the terminal one short-stalked, 4–5 in. long, 1½–2 in. broad, obovate or ovate-elliptical, the edge irregularly and closely, but not deeply toothed, the base rounded, the lateral ones sessile, texture very succulent, both sides, when young, arachnoid. Flowers in copiously-compound glabrous cymes, 3–4 in. broad. Peduncles 2–4 in. long. Pedicels ¼ in. long, slender. Calyx cyathiform, scarcely lobed, succulent, about 1 line broad. Corolla ⅓ in. deep and about as broad, slightly pubescent. Petals and stamens 4. Style equalling the petals. Berry the size of a pea, globose, reddish-violet.—Bot. Mag. 5479.

Lower Guinea. Angola, *Dr. Welwitsch!*

A very curious and distinct species. Its nearest ally is the Namaqualand *V. Baincsii,*

Bot. Mag. t. 5472, in which the habit is quite similar but the leaflets not more than three in number.

50. **V. crassiuscula,** *Baker.* Stems slender, firm-herbaceous, wide-climbing, clothed with deciduous, fine, grey, glandular pubescence. Petioles ¼–½ in. long, grey-glandular, like the branches. Leaflets 5, all distinctly stalked, the petiole of the central one 2–4 lines long, the central leaflet ovate-oblong, 1–1½ in. long, by about half as broad, the point bluntish, the base rather rounded, the edge irregularly crenate-repand, the surface crisped towards the edge, texture quite succulent, upper surface grass-green, lower permanently matted with grey glandular tomentum like that of the branches. Flowers in copiously compound lax cymes, 4–8 in. broad, on glandular, elongated, weak, herbaceous peduncles, 3–4 in. long. Ultimate pedicels slender, finely downy, 1–1½ line long. Calyx ½ line broad, fleshy, not lobed, downy. Corolla 1 line deep, cylindrical, downy. Stamens and petals 4. Style subulate. Immature fruit ovoid, grey-tomentose.

Lower Guinea. Loanda, Angola, *Dr. Welwitsch!*

General habit and cymes of *V. cymosa*, but the leaves much smaller and permanently matted beneath.

51. **V. andongensis,** *Welw. mss.* Stem stout, firm-herbaceous, conspicuously striated, clothed, when young, with fine, short, salmon-coloured tomentum. Stipules ovate, brown, under ½ in. long. Petioles 1 in. long, stout, herbaceous and downy like the branches. Leaves digitate, with 5 sessile obovate-lanceolate leaflets, the central one 4–7 in. long, 2–3 in. broad, the point acute, the edge faintly inciso-crenate, the base cuneate, texture thick and considerably fleshy; upper surface bright green and glabrous, lower densely and permanently matted with thick, salmon-coloured, almost woolly tomentum. Flowers in copiously-compound cymes, 4–5 in. broad, on stout herbaceous peduncles, 1–2 in. long. Pedicels downy, about 1 line long. Clusters not bracteated. Calyx ½ line broad, very downy, slightly 4-lobed. Corolla 1 line deep, constricted, downy on the outside. Petals and stamens 4. Style subulate. Fruit oblong, 4 lines long when dried, black and quite glabrous.

Lower Guinea. Pungo Andongo, Angola, *Dr. Welwitsch!*

52. **V. chloroleuca,** *Welw. mss.* Stem stout, firm-herbaceous, conspicuously striated, slightly grey-downy when young. Stipules 1 in. long, lanceolate, brown, membranous. Petioles 3–4 in. long, stout, herbaceous, nearly glabrous. Leaves with 5 sessile ovate-oblong leaflets, the central one 6–9 in. long, 4–5 in. broad, the point acute, the base subcuneate, the edge slightly inciso-dentate, texture thick, firm, considerably fleshy, upper surface bright green and glabrous, lower densely and permanently matted with thick, appressed, grey, cottony tomentum. Flowers in copiously-compound cymes, 4–6 in. broad, on stout herbaceous peduncles about 2 in. long. Clusters with deciduous, linear, brown, membranous bracts, nearly ½ in. long. Pedicels slender, 1–1½ lines long, grey-downy. Calyx ¾ line broad, downy, subentire. Corolla reddish, 1 line deep, slightly downy, soon expanding. Petals and stamens 4. Berry oblong, ½ in. long when dried, densely clothed with grey tomentum. Style subulate.

Lower Guinea. Huilla, Angola, *Dr. Welwitsch !*

Resembles the preceding in general habit; best distinguished by its woolly fruit and curious bracts.

53. **V. pendula,** *Welw. mss.* Stem herbaceous, moderately stout, brownish, much striated, not pubescent, densely clothed with long, spreading or deflexed, weak, gland-tipped bristles, the same colour as the stem. Stipules large, ovate-acuminate, membranous. Petioles 2–3 in. long, weak, herbaceous, bristly like the branches. Leaves with 5 sessile, obovate-lanceolate leaflets, the central one 3–5 in. long, 1½–2 in. broad, the point acute, the base cuneate, the edge deeply inciso-dentate, texture thin but fleshy, upper surface bright green, glabrous, lower permanently clothed all over with fine, short, nearly white, cottony tomentum. Tendrils copious, herbaceous, bristly like the branches. Flowers in copiously compound cymes, 4–6 in. broad, on bristly herbaceous peduncles, 3–4 in. long. Clusters with scarious, brown, lanceolate bracts, which exceed them. Pedicels generally about 1 line long, slender, setose. Calyx not more than 1 line broad, pubescent and very setose. Petals and stamens 4. Style subulate. Berries about 4 lines long, roundish-pyriform, pendulous, red, copiously clothed with gland-tipped bristles like the rest of the plant.

Lower Guinea. Pungo Andongo, Angola, *Dr. Welwitsch !*

A very distinct species.

54. **V. Thonningii,** *Baker.* Stems firm-herbaceous, slender, terete, finely grey-downy and glandular when young. Petioles 1–3 in. long, firm-herbaceous and clothed like the branches. Leaflets 5, distinctly stalked, the terminal one obovate-oblong, 2–4 in. long by about half as broad, the point bluntish, the base cuneate, the edge irregularly crenate-repand, texture fleshy but not very thick, upper surface glabrous, lower slightly grey-downy. Flowers in copiously branched lax cymes, 4–6 in. broad, on firm herbaceous peduncles, 2–3 in. long. Clusters without bracts. Pedicels 1 line long, grey-downy. Calyx ½ line broad, grey-downy, subentire. Corolla 1 line deep, constricted, slightly downy. Petals and stamens 4. Style subulate. Berries roundish-oblong, pendulous, 4–5 lines long, densely clothed with grey down.—*Cissus cymosa*, Schum. et Thonn. Pl. Guin. 82; Hook. f. Fl. Nigrit. 268.

Upper Guinea. Guinea proper, *Thonning;* Nupe, *Barter !* Accra, *T. Vogel !*
Lower Guinea. Loanda and Pungo Andongo, Angola, *Dr. Welwitsch !*

Some of Dr. Welwitsch's specimens have the leaves opposite about the middle of the stem. We are obliged to drop the name *cymosa*, because there is already a *V. cymosa* of Blume.

55. **V. cyphopetala,** *Fresen. in Mus. Senck.* ii. 282 (*Cissus*). Stem herbaceous, angular, finely grey-downy, finely striated. Petioles about 2 in. long, weak, herbaceous, finely tomentose. Tendrils copious, herbaceous. Leaves with 3–5 leaflets, the terminal one on a stalk ½ in. long, obovate-oblong, 2–3 in. long, 1–1½ in. broad, indistinctly pointed, the edge broadly crenate, the base rounded, the lateral ones similar, usually considerably imbricated, texture thin but rather succulent, upper side slightly grey-downy, the lower more so. Flowers in copiously compound cymes 3–5 in. broad. Peduncles 2–3 in. long, weak, glabrous. Pedicels weak, tomentose, 2–3 lines long. Calyx under ½ line broad, pubescent, not lobed. Corolla 2 lines long,

cylindrical, pubescent. Petals and stamens 4. Style subulate, ⅓ in. long. Berry unknown.

Nile Land. Abyssinia, *Schimper!* (Abyssinian name "Ilalenke temen"); Unyoro plateaux, *Speke and Grant!*

56. **V. pruriens,** *Welw. mss.* Stems stout, herbaceous, wide-climbing, finely striated, finely clothed throughout with short grey hairs tipped with brownish glands. Stipules lanceolate, 1 in. or more long, scarious, glandular. Lower petioles 4–6 in. long, like the stem in texture and glandulosity. Leaflets 5, the three upper ones on petiolules 1¼–1¾ in. long, rotundate-cordate, 2–3 in. broad by rather more deep, the basal lobes broadly rounded, the point acute, the edge with sharp subdeltoid teeth, the lower pair smaller and the stalks much shorter, texture considerably fleshy, both sides pale green and glandular all over like the stems, especially on the veins beneath. Flowers in lax copiously compound cymes, ultimately 6–9 in. broad, on glandular herbaceous peduncles 3–4 in. long. Ultimate pedicels 1½–2 lines long, very glandular. Calyx cyathiform, entire, ½ line broad. Petals and stamens 4, the former oblong, blood-red, soon spreading, 1 line long, glandular on the outside. Style subulate, equalling the stamens. Berry oblong, watery, ½ in. long when mature, red, densely glandular like the rest of the plant.

Lower Guinea. Huilla, Angola, *Dr. Welwitsch!*

57. **V. stipulacea,** *Baker.* Stem stout, angular, herbaceous, weak, densely clothed, when young, with spreading, grey, woolly hairs, some of them gland-tipped. Petioles 4–6 in. long, stout, herbaceous and woolly like the branches. Leaflets 5, subsessile, lanceolate-obovate, the central one 5–6 in. long by half as broad, the point acute, the base cuneate, the edge irregularly and sharply inciso-dentate, texture rather fleshy and moderately thick, upper surface glabrous when mature, lower finely grey-downy. Stipules cordate-ovate, membranous, downy, subpersistent, ½–¾ in. long. Flowers in lax copiously compound cymes ultimately 6–8 in. broad, on herbaceous peduncles 4–6 in. long. Pedicels 1–3 lines long, weak, glandular and grey-downy. Calyx ½ line broad, not lobed. Corolla 1 line deep. Petals and stamens 4. Style subulate. Berries oblong, 4 lines long when dried, red, finely grey-downy and glandular.

Lower Guinea. Ambaca, Cazengo, and Pungo Andongo, Angola, *Dr. Welwitsch!*

In general habit and inflorescence resembling *V. serpens* and *mollis*, but the leaves are fleshy, and calyx, corolla, and fruit glandular.

58. **V. stenoloba,** *Welw. mss.* Stems erect or suberect, 1–2 ft. long, stout, herbaceous, finely striated, finely grey-downy and glandular, without tendrils. Stipules broadly cordate-ovate, fleshy, ½–¾ in. deep. Petioles 0 or very short, the leaves digitately 3- or 5-foliolate, the leaflets quite sessile, linear or narrowly oblanceolate, 4–7 in. long, ¼–1 in. broad, the point acute, the edge distantly and irregularly faintly inciso-dentate, the base narrowed into a winged petiole, texture considerably fleshy, both sides thinly grey- or brownish-downy and glandular. Flowers in compound cymes not more than 1½–2 in. broad, on terminal, finely downy and glandular, herbaceous peduncles, 2–3 in. long. Ultimate pedicels about 1 line long, downy and glandular.

Calyx downy and glandular, cyathiform, scarcely toothed, about ½ line broad. Stamens 4. Petals not seen. Style subulate. Berries subglobose, ¼–⅜ in. each way, blood-red, naked, gratefully acid.

Lower Guinea. Huilla, Angola, *Dr. Welwitsch!*

59. **V. constricta,** *Baker.* Stem wide-climbing, firm, ¼ in. thick, finely striated, naked, constricted at the nodes. Petioles herbaceous, spreading, weak, glabrous, 1–2 in. long. Tendrils stout, firm, glabrous. Leaves with 5 leaflets, the terminal one obovate-elliptical, 3–4 in. long, ¾–1 in. broad, the point acute, the edge entire, the lower part cuneate, narrowed gradually into a petiole about ½ in. long, the lateral ones similar, short-stalked, erecto-patent, the basal pair small, deflexed, sessile, texture coriaceous when dry, both sides glabrous. Flowers in a long thyrsoid glabrous panicle, with a zig-zag axis. Peduncles 2–3 in., stout, succulent. Pedicels slender, often ½ in. long. Calyx 1 line broad, fleshy, cyathiform, not lobed. Petals 4, pale, fleshy, cohering at the top, ⅛ in. long. Stamens 4. Style nearly equalling the corolla. Young fruit ovoid, erect, glabrous.

Upper Guinea. Nupe, Niger country, *Barter!*

60. **V. subciliata,** *Baker.* Stems herbaceous, wide-climbing, terete, finely striated, clothed with scattered deciduous setæ. Tendrils glabrous, herbaceous. Leaves sessile, with 3–5 leaflets, the terminal one oblong or obovate, 1½–2 in. long, more than 1 in. broad, the point bluntish, the edge sharply but irregularly and not deeply toothed, the base rounded, the secondary petiole ¼–½ in. long, the lateral ones nearly sessile and often more rounded at the base, especially on the lower side, texture almost succulent, both sides glabrous. Inflorescence in a lax subcymose panicle, 2–3 in. broad, the ultimate clusters of 1–3 flowers each. Pedicels ⅛ in. long, glabrous. Calyx cyathiform, not lobed, ½ line broad. Corolla 1 line long. Petals and stamens 4. Style nearly equalling the petals. Berries ½ in. long, oblong, naked.

Mozamb. Distr. Zambesi-land, near Tette and banks of the Luabo river, *Dr. Kirk!* Closely allied to the E. Indian *C. setosa,* Roxb.

61. **V. Vogelii,** *Hook. f. Fl. Nigrit.* 267 (*Cissus*). Stem wide-climbing branched, stout, herbaceous, sulcate, deciduously setose. Petioles 4–6 in. long, weak, herbaceous, slightly setose. Tendrils herbaceous. Leaves digitate, with 5 leaflets, the central one obovate, 2–4 in. long, 1–1½ in. broad, the apex acuminate or cuspidate, the edge sharply, not deeply toothed, the lower half between cuneate and spathulate, the others similar, texture membranous, colour bright green, upper surface glabrous, lower very slightly pubescent on the veins. Flowers in copiously branched lax cymes, 6–9 in. broad. Peduncles 5–6 in. long, stout, herbaceous. Pedicels ¼–½ in. long, slender, glabrous. Calyx cyathiform, not lobed, glabrous or slightly pubescent, under ½ line broad. Corolla under ⅛ in. long, pubescent. Petals and stamens 4. Style subulate, equalling the petals. Berry glabrous, globose, black when mature.

Upper Guinea. Fernando Po, *T. Vogel!*
Lower Guinea. Golungo Alto, Angola, *Dr. Welwitsch!*

62. **V. cirrhosa,** *Thunb.; DC. Prod.* i. 631. Stems wide-climbing, herbaceous, finely striated, often densely clothed with deciduous setæ. Petioles 2–4 in. long, weak, glabrous or ciliated. Tendrils copious, glabrous, herbaceous. Leaves digitate, with 5 sessile leaflets, the terminal one obovate, 4–6 in. long, 1½–2 in. broad, the apex pointed, the edge with shallow mucronate teeth, the lower half narrowed gradually to the base, the lateral ones similar but smaller, especially the basal pair, texture membranous, colour bright green, both sides glabrous or the under one slightly pubescent. Flowers in a subcymose panicle, which is ultimately 6–9 in. broad. Pedicels ¼–½ in. long, villose, ultimately cernuous. Calyx cyathiform, ½ line broad, not lobed, glabrous or finely villose. Corolla ⅛ in. long, greenish. Petals and stamens 4. Style subulate, equalling the corolla. Fruit oblong, setose, ½ in. long.—*Cissus*, Pers. Ench. i. 142; Harv. et Sond. Fl. Cap. i. 252. *C. quinata*, Ait.; DC. Prod. l. c.

Mozamb. Distr. Zambesi-land, in several places, *Dr. Kirk!*
Nile Land. Karague, *Speke and Grant!*

A weak, wide-climbing shrub, with large, deciduous, membranous stipules and bracts. We have imperfect specimens of a closely allied plant with naked stems, leaves, and fruit from the banks of the Niger, *Barter!*

63. **V. paucidentata,** *Klotzsch in Peters' Mossamb. Bot.* i. 179 (*Cissus*). Stem wide-climbing, herbaceous, naked, terete, striated. Leaves digitate, with 5 sessile leaflets, the terminal one obovate, 2–3 in. long, 1 in. broad, the apex acuminate, the upper part with a few distant acute teeth, the lower half cuneate-spathulate, the lateral ones similar, the basal pair smaller, texture membranous, colour bright green, both sides glabrous. Flowers in a copiously compound cyme about 3 in. broad, the ultimate clusters few-flowered. Pedicels ¼ in. long, glabrous, very slender. Calyx cyathiform, scarcely lobed, ⅓ line broad, nearly naked. Corolla 1 line long, cylindrical, constricted at the middle. Petals and stamens 4. Style subulate, nearly equalling the petals. Fruit unknown.

Mozamb. Distr. Sofala, Inhambane, *Peters!*

This most resembles *V. gracilis* in the texture of its stem and leaves, but the latter are digitate.

64. **V. angolensis,** *Baker.* Stems wide-climbing, woody, slender, terete, naked. Petioles 2–4 in. long, firm, glabrous. Leaves with 5 distinctly stalked leaflets, the central one oblong, 3–6 in. long, 2–4 in. broad, rounded at the base, the point acute, the edge sharply and irregularly inciso-dentate, texture membranous, firm but thin, the under side slightly downy on the veins when young, both surfaces glabrous when mature. Tendrils copious, firm. Flowers in dense copiously compound cymes, on short, naked, woody peduncles. Pedicels very short, slightly grey-downy when young. Calyx ½ line broad, glabrous, cyathiform, 5-lobed. Buds oblong, naked. Petals blood-red, 5, about a line long, spreading. Stamens 5. Style obsolete. Fruit subglobose, glabrous.

Lower Guinea. Golungo Alto and Cazengo, Angola, *Dr. Welwitsch!*

65. **V. multistriata,** *Baker.* Stem wide-climbing, woody, firm, terete,

glabrous, much and finely striated. Petioles 2–4 in. long, firm, glabrous. Tendrils long, copious, glabrous, much branched. Leaves with 5 subsessile leaflets, the terminal one ovate, 5–6 in. long, 2–3 in. broad when mature, pointed, the edge sharply but not deeply toothed, the base cuneate, the lateral ones nearly as large, imbricated, the lowest pair rounded at the base, texture herbaceous, both sides glabrous. Flowers in copiously compound, short-stalked, lateral, thyrsoid panicles. Pedicels about 1 line long, slightly villose in the early stage. Calyx ⅓ line broad, naked, cyathiform, slightly 5-lobed. Petals 5, oblong, cream-coloured, 1 line long. Stamens 5. Ovary pentagonal, crowned by the short style. Berry ovoid, ½ in. deep, 2-celled, each cell 1–2-seeded.—*V. pentaphylla*, Guill. et Perr. Fl. Seneg. 135. t. 33, non Thunberg.

Upper Guinea. Nupe, Niger country, *Barter!* Senegambia, *Perrottet! Ingram! Heudelot!*

Mozamb. Distr. Rovuma, *Dr. Kirk!*

A large-growing woody climber, with clusters of fruit like those of *V. vinifera*, and leaves not unlike those of *Ampelopsis quinquefolia*.

66. **V. oxyphylla,** *A. Rich. Fl. Abyss.* i. 142. Stem firm, wide-climbing, terete, striated, glabrous. Petioles 1–2 in. long, firm, glabrous. Tendrils copious, slender, branched, glabrous. Leaves with 5 leaflets, all on short stalks, the terminal one oblong-obovate, pointed, 2–4 in. long, ¾–1 in. broad, the edge inciso-crenate, the lower half narrowed but the base rather rounded, the lateral ones similar but smaller, the basal pair deflexed, texture firm-herbaceous, both sides quite glabrous, upper surface shining, lower paler. Flowers in copiously compound cymes 2–4 in. broad. Pedicels ⅛ in. or more long, naked or glandular. Calyx ⅓ line broad, glabrous, cyathiform, not lobed. Corolla ⅛ in. long, cylindrical, constricted. Petals and stamens 4. Style subulate, 1 line long. Berries turbinate, black, glabrous, ¼–⅜ in. long when dried.—*Cissus Schimperi*, Hochst. in Schimp. Pl. Abyss. n. 180.

Nile Land. Abyssinia, *Schimper! Dillon and Petit!*

67. **V. bororensis,** *Klotzsch in Peters' Mossamb. Bot.* 179 (*Cissus*). Stem wide-climbing, slender, but firm, angular, sulcate, glabrous. Petioles 1–2 in. long, slightly downy when young. Tendrils firm, copious. Leaves with 5 leaflets, the terminal one oblong or obovate, the point acute, the edge deeply serrated, the base narrowed gradually into a short petiole, texture herbaceous, both sides glabrous when mature. Flowers in a copiously branched thyrsoid panicle, 6 in. long, 4 in. broad, with the main branches springing at right angles from the axis and the ultimate clusters subcymose. Pedicels 2–3 lines long, glabrous. Calyx cyathiform, ⅓ line broad, scarcely toothed, glabrous. Corolla 1 line long, cylindrical, constricted at the middle. Petals and stamens 4. Style subulate. Fruit unknown.

Mozamb. Distr. Zambesi, Boror, *Peters!*

Like *V. oxyphylla* in habit and the shape and clothing of its leaves, but in that the flowers are cymose and the outer leaflets stalked.

68. **V. aralioides,** *Welw. mss.* Stem climbing to a length of 30 ft., woody below, scarcely more than herbaceous upwards, moderately stout, quite glabrous, finely striated. Stipules soon deciduous. Petioles slender, herbaceous, glabrous, 3–4 in. long. Leaflets 5, the petiolules of the terminal ones

¼–⅜ in. long, the leaflets oblong or with a slight obovate tendency, 2–3 in. long, 1¼–1½ in. broad, the point acute, the edge faintly and distantly denticulate, the base subcuneate; texture membranous, both sides green and quite glabrous. Flowers in copiously compound, stalked, thyrsoid panicles, the ultimate clusters 10–12-flowered; ultimate pedicels firm, slightly grey-downy, ⅛–¼ in. long. Calyx nearly 1 line broad, deeply cyathiform, slightly grey-downy, quite entire. Corolla oblong, 1 line deep, not at all constricted. Stamens and petals 4, the latter reddish, permanently cohering. Style subulate. Berry roundish, watery, nearly 1 in. each way, bluish-purple, glabrous, edible, 1-seeded.

Lower Guinea. Golungo Alto, Angola, *Dr. Welwitsch!*

69. **V. congesta,** *Baker.* Stem firm-herbaceous, slender, terete, slightly grey-downy. Leaves quite sessile, sometimes opposite; leaflets 3–5, distinctly stalked, the central one obovate-oblong, 2½–3 in. long by about half as broad, the point subacute, the base cuneate, the edge irregularly and conspicuously inciso-dentate; texture membranous, colour bright green, lower side a little downy. Flowers in copiously compound lax cymes 4–5 in. broad, on short, firm-herbaceous peduncles. Clusters not bracteated; pedicels 1 line long, densely grey-downy. Calyx ½ line broad, grey-downy, not lobed. Corolla 1 line deep, constricted, downy on the outside. Petals and stamens 4. Style subulate. Berries roundish, pyriform, ¼ in. deep when dried, glabrous.

Mozamb. Distr. Zambesi-land, *Dr. Meller!*
Native name *Kautawana.*

70. **V. Mannii,** *Baker.* Stem wide-climbing, weak, herbaceous, glabrous, deeply sulcate. Petioles 2–3 in. long, weak, glabrous, herbaceous. Tendrils herbaceous, weak. Leaves with 5 leaflets, the central one obovate-elliptical, 2–3 in. long, 1–1½ in. broad, the apex acute, the edge conspicuously serrated, the lower half subentire and cuneate with a short petiole, the others similar but smaller; texture membranous, colour bright green, both sides nearly glabrous when mature. Flowers in copiously compound lax cymes, 3–4 in. broad. Peduncles 3–6 in. long, weak, slender, herbaceous, the upper part densely villose; pedicels slender, villose, 1–2 lines long. Calyx ½ line broad, cyathiform, villose, not lobed. Corolla cylindrical, 2 lines long. Petals and stamens 4. Style subulate, nearly equalling the petals. Fruit unknown.—*V. cyphopetala,* var. *occidentalis,* Hook. f. in Journ. Linn. Soc. vii. 189.

Upper Guinea. Camaroons mountain, at 7000 ft., *Mann!*
Cyme and flowers of *V. cyphopetala,* but the leaves different.

71. **V. serpens,** *Hochst. in Rich. Fl. Abyss.* i. 111 (*Cissus*). Stem stout, herbaceous, wide-climbing, deeply striated, thinly clothed with fine, grey, glandular pubescence. Stipules lanceolate, herbaceous, ¾–1 in. long. Leaves digitately 5–7-foliolate, sessile or with short, herbaceous, grey-downy petioles, the leaflets obovate-lanceolate, the central one 4–6 in. long, 1½–2 in. broad, the point acute or bluntish, the base cuneate, the edge conspi-

cuously and irregularly inciso-dentate; texture membranous, veins beneath clothed with fine grey down. Tendrils weak, herbaceous. Flowers in copiously compound cymes 3 or 4 in. broad, on stout herbaceous peduncles 3–4 in. long; pedicels 1 line long, clothed with glandular grey down. Calyx ½ line broad, not lobed. Corolla 1 line deep. Petals and stamens 4. Berry oblong-turbinate, glabrous, 4 lines long when dry, tipped with the subulate style.

Nile Land. Gallabat, *Schweinfurth!* Abyssinia, *Schimper!*

Var. β. *V. mollis*, Steud. in A. Rich. Fl. Abyss. i. 111 (*Cissus*). Leaves and stems more downy and the pubescence with a ferruginous tinge; pedicels longer. Abyssinia, *Schimper!*

72. **V. flavicans,** *Baker.* Stem suberect, stout, firm-herbaceous, angular, deeply striated, when young slightly grey-downy and setose, when mature glabrous. Petioles 4–6 in. long, angular, compressible, striated, clothed with short, spreading, yellowish hairs and pellucid setæ. Tendrils none in our specimens. Leaves digitate with 5 sessile leaflets, the terminal one oblong-lanceolate, 6–10 in. long, 2–3 in. broad, the point acute, the edge slightly inciso-crenate, the lower part narrowed gradually to a cuneate base, the lateral ones similar, close but not imbricated, the lowest pair rounded on the outer side at the base; texture firmly membranous, upper surface scabrous, lower clothed, especially on the raised veins and veinlets, with fine, stiff, yellowish hairs. Flowers in copiously branched, short-stalked, lateral cymes, 6–8 in. broad; pedicels ⅛–¼ in. long, villose and densely setose. Calyx cyathiform, not lobed, ¾–1 line broad, densely villose. Petals and stamens 4. Style ⅛ in. long. Fruit crimson, turbinate, densely setose, ¼ in. deep.

Upper Guinea. Niger country, *Barter!*

General habit of the preceding, but the leaves thicker in texture, the stems stronger, and berry glandular.

73. **V. curvipoda,** *Baker.* Stems slender but quite woody, wide-climbing, angular, naked, deeply sulcate. Petioles 1–5 in. long, firm, clothed with fine, grey, deciduous pubescence. Tendrils firm, copious, glabrous. Leaves with 5 leaflets, the terminal one obovate-oblong, 4–5 in. long, 1½–2 in. broad, the point acute, the edge with a few shallow, broad, mucronate crenations, the base rounded or cuneate, the petiolule 1 in. long, clothed with fine grey pubescence, the lateral ones similar but smaller and on shorter stalks; texture membranous, both sides finely pubescent, especially on the veins when young, nearly glabrous when mature. Flowers in a cymose panicle 3–4 in. broad. Peduncles 3–4 in. long, firm, downy; pedicels ½–1 line long, villose. Calyx under ½ line broad, villose, slightly lobed. Corolla longer than broad. Petals and stamens 4. Style nearly equalling the corolla. Young fruit pendulous, turbinate, both downy and slightly setose.

Upper Guinea. Island of St. Thomas, 2000 ft. above sea-level, *Mann!*

74. **V. concinna,** *Baker.* Stems terete, slender, quite woody, wide-climbing, slightly matted when young with cottony tomentum, for the rest

glabrous. Petioles 1–1½ in. long, firm and slightly matted. Leaflets 5, the petiole of the terminal one more than ½ in. long, the central leaflet obovate-oblong, 2–2½ in. long by about half as broad, the apex acute, the base broadly rounded, the edge faintly inciso-dentate; texture membranous, upper surface nearly or quite glabrous when mature, lower matted all over with appressed, grey, slightly salmon-coloured, cottony tomentum. Tendrils firm and copious. Flowers in dense cymose heads about 1 in. broad, on firm woody peduncles 1 in. or less in length; pedicels very short. Calyx ¼ line broad, distinctly 5-lobed, scarious and considerably webbed. Buds crimson, roundish, glabrous, under 1 line long. Stamens and petals 5, the latter soon spreading. Berry not seen.

Lower Guinea. Loanda, Angola, *Dr. Welwitsch!*

75. **V. obtusata,** *Welw. mss.* Stems wide-climbing, quite woody, terete, striated, only the young branches slightly grey-downy. Petioles about 1 in. long, firm, woody, slightly downy. Leaflets 5, the terminal one on a petiolule 3–4 lines long, the leaflets obovate, 4–6 in. long by half as broad, narrowed throughout the lower half, the point obtuse, the edge faintly toothed; texture membranous, upper surface glabrous, lower thinly grey-downy, the lateral leaflets sessile or nearly so. Flowers in dense cymose heads, 1 or finally 2 in. broad, on woody peduncles 1 in. or rather more long; pedicels very short. Buds globose, crimson, Calyx 1 line broad, scarious, distinctly 5-lobed. Stamens and petals 5. Style none. Young fruit glabrous, turbinate.

Lower Guinea. Pungo Andongo, Angola, *Dr. Welwitsch!*

76. **V. arcuata,** *Welw. mss.* Stems quite woody, stout, terete, faintly grey-downy when young, 4–6 ft. high, at first erect, afterwards arcuate, the leaves and branches secund. Petioles 1–1½ in. long, woody, slightly grey-downy. Leaflets 5, the central one on a petiolule 3–4 lines long, the leaflets lanceolate-obovate, 4–5 in. long, about 2 in. broad, the point acute, the base cuneate, the edge sharply and irregularly inciso-dentate; texture membranous, upper surface glabrous, lower thinly clothed with grey rather cottony pubescence. Flowers in dense cymose heads about 1 in. broad, on firm woody peduncles about 1 in. long; pedicels glabrous, very short. Calyx deeply cyathiform, ¾ line broad, glabrous, indistinctly 5-lobed. Buds globose, glabrous. Stamens and petals 5, the latter reddish-purple, yellow within. Style 0. Immature fruit glabrous, turbinate.

Lower Guinea. Pungo Andongo, Angola, *Dr. Welwitsch!*

77. **V. dissecta,** *Baker.* Stems stout, suberect, 3–5 ft. high, deeply sulcate, slightly matted upwards with cottony tomentum. Petioles 1½–3 in. long, firm. Leaflets 3–5, the lateral ones sessile or nearly so, the terminal one on a petiole about ¼ in. long, oblong or obovate in general outline, 6–8 in. long by about half as broad, pinnatifid nearly or quite halfway down to the midrib, the point blunt or subacute, the base cuneate, the edge distinctly inciso-dentate; texture membranous, upper surface green, glabrous when mature, lower matted all over with appressed, grey or slightly salmon-coloured,

cottony tomentum. Tendrils 0 in the specimens. Flowers in congested cymes not more than 1 in. broad, on firm, woody, slightly matted peduncles about 1 in. long; pedicels very short. Calyx 1 line broad, deeply cyathiform, brown, scarious, not lobed. Buds globose, naked. Stamens and petals 5, the latter crimson. Style 0. Fruit not seen.

Lower Guinea. Huilla and Pungo Andongo, Angola, *Dr. Welwitsch!*

In everything except the leaves this resembles *V. heracleifolia*, and it is not unlikely they may be two forms of one species.

IMPERFECTLY KNOWN SPECIES.

78. **V. Figariana,** *Webb, Frag. Fl. Æthiop.* 58 (*Cissus*). Stem short, erect, the whole plant clothed with hairs and purplish setæ. Leaves sessile with 5–7 leaflets (shape not stated). Flowers in terminal cymes. Ovary glabrous. Style short. Calyx and purplish corolla setose like the rest of the plant.

Nile Land. Nubia, *Figari.*

2. **LEEA,** Linn.; Benth. et Hook. f. Gen. Pl. i. 388.

Calyx cyathiform, deeply 5-lobed. Petals 5, partially connate with the tube of stamens, at first cohering by their edges, finally recurved. Stamens 5, the filaments connected by a tube which is more than half as long as the corolla, the anthers bent over its edge and united together in a ring inside it. Ovary 5–6-celled. Style short. Fruit a depressed, dry, 5–6-celled berry with 1 seed in each cell.—Shrubs with opposite pinnate or rarely 2-pinnate leaves.

A small genus almost confined to tropical Asia.

Corolla $\frac{1}{8}$ in. deep . . . . . 1. *L. sambucina.*
Corolla $\frac{1}{4}$ in. deep . . . . . 2. *L. tinctoria.*

1. **L. sambucina,** *Willd.; DC. Prod.* i. 635. A suberect woody shrub about 8 ft. high, without tendrils. Branches woody, terete, naked. Leaves with a terminal leaflet and 1–4 shortly stalked similar ones on each side, or rarely 2-pinnate below; leaflets elliptical, 4–8 in. long, 2–3 in. broad, the apex pointed, the edge distantly and not deeply toothed, the base rounded; texture firmly membranous, both sides glabrous. Flowers in a copiously branched sessile or pedunculated cyme with tomentose or naked branches. Calyx cyathiform, green, villose, with 5 teeth which are about as broad as deep. Corolla oblong, $\frac{1}{8}$ in. deep, glabrous, bright red on the outside, yellow within or entirely orange. Petals 5. Corona more than half as deep as the corolla, connate with it below, free upwards, the edge faintly toothed, the filaments equalling it and the anthers joined edge to edge inside it. Berries hard, naked, depresso-globose, 5–6-seeded, 5–6-sulcate, $\frac{1}{4}$–$\frac{3}{8}$ in. broad.—Schum. et Thonn. Pl. Guin. 134. *L. guineensis,* Don, Gen. Syst. i. 712.

Upper Guinea. Fernando Po, Sierra Leone, and the Niger country, gathered by all collectors. "One of the greatest ornaments of the forest."

Lower Guinea. Congo, *Smith!* Angola, *Dr. Welwitsch!*
Ranges through tropical Asia to Polynesia.

2. **L. tinctoria,** *Lindl. mss. in Herb. Kew.* A suberect shrub, 5–10 ft. high with woody, terete, naked branches. Petioles 3–4 in. long, firm, naked, woody. Leaflets in 2 opposite pairs 2–3 in. apart, and a terminal one, oblong, 5–8 in. long, 2½–3 in. broad, the point acute, the base broadly cuneate or a little rounded, the edge indistinctly toothed; texture subcoriaceous, both sides glabrous; petiolules of the side leaflets ⅜–½ in. long. Flowers in lax cymes 5–6 in. broad, on firm woody peduncles 3–4 in. long, the branches ferrugineo-tomentose; ultimate pedicels ¼ in. long. Calyx glabrous, campanulate, 1½–2 lines deep with 5 deltoid teeth reaching about a third down. Buds narrow-oblong. Corolla 5–6 lines deep, the petals the same colour as in the preceding; the staminal tube three-quarters as long as the corolla. Fruit not seen.

Upper Guinea. Island of St. Thomas, *Ackerman! Dr. Welwitsch!*
Used in dyeing. Dr. Lindley and Dr. Welwitsch have both given it the same specific name in manuscript independent of one another.

Order XLIV. SAPINDACEÆ (by Mr. J. G. Baker).

Flowers usually polygamous, regular or irregular. Sepals 4–5, rarely 0 or more numerous, free or more or less connate, often unequal, usually imbricated, sometimes valvate. Petals 3–5, rarely 0 or more numerous, equal or unequal, the lower often absent or smaller than the rest, imbricated, usually bearded or furnished with a scale on the inner face. Disk various, complete or incomplete, sometimes 1-sided, rarely absent. Stamens 5–24, in the African species usually 8, usually inserted below the disk, sometimes unilateral, straight or declinate, sometimes inserted above the disk or round its base; the filaments usually elongated, filiform or subulate, often villose. Anthers oblong and didymous or linear and tetragonous, versatile or attached at the base. Ovary central or eccentric, entire or more or less, often deeply, lobed, 1–4, usually 3-celled. Style terminal, simple or divided, straight or declinate, sometimes twisted; stigma usually simple. Ovules anatropal campylotropal or amphitropal, usually solitary in the cells, ascending and affixed to the axis, with a usually ventral raphe and inferior micropyle, rarely horizontal or inverted, the funiculus usually tumid. Fruit capsular or indehiscent, drupaceous baccate or coriaceous, entire or lobed, rarely of 2–3 samaras, the valves dehiscing variously. Seeds globose or compressed, naked or arillate; testa various, often horny; albumen usually 0. Embryo usually thick, often plicate or spirally convolute. Cotyledons usually plano-convex, large and unequal, collateral or superposed; radicle short, inferior, mostly descending.—Often tall trees, rarely shrubs or herbs, sometimes climbing and cirrhiferous. Leaves alternate in the suborders represented in tropical Africa, often evergreen, usually without stipules, simple or compound, imparipinnate or equally pinnate. Inflorescence various, Flowers always small and inconspicuous. Fruit occasionally edible.

An Order of 600–700 species, mostly tropical, but a very small proportion African.

Seeds exalbuminous.
Ovules solitary in the cells.
Flowers irregular, with a unilateral disk.
Fruit not vertically lobed.
Fruit an inflated membranous capsule . . . . . 1. CARDIOSPERMUM.
Fruit a hard bony pyriform capsule . . . . . 2. PAULLINIA.
Fruit deeply lobed vertically into indehiscent cocci.
Sepals 5 . . . . . 3. ERIOGLOSSUM.
Sepals 4 . . . . . 4. SCHMIDELIA.
Flowers regular with a centrical disk.
Fruit dehiscent.
Sepals much imbricated . . . . . 5. CUPANIA.
Sepals scarcely or not at all imbricated.
Disk thick, fleshy . . . . . 6. BLIGHIA.
Disk thin, membranous . . . . . 7. ERIOCŒLUM.
Fruit indehiscent.
Fruit not lobed vertically.
Sepals much imbricated . . . . . 8. LECANIODISCUS.
Calyx with 5 valvate lobes reaching about halfway down . . . . . 9. CHYTRANTHUS.
Fruit vertically 2–3-partite nearly or quite to the base.
Seeds exarillate . . . . . 10. SAPINDUS.
Seeds arillate . . . . . 11. DEINBOLLIA.
Ovules 2 in the cells . . . . . 12. DODONÆA.
Seeds albuminous . . . . . 13. BERSAMA.

1. CARDIOSPERMUM, Linn.; Benth. et Hook. f. Gen. Pl. i. 393.

Flowers irregular, polygamo-dicœcious. Sepals 4, concave, broadly imbricated, the 2 outer ones small. Petals 4, in 2 pairs, the larger ones with a large scale and the smaller ones with a small one. Disk unilateral, undulated, with 2 glands opposite the inferior petals. Stamens 8, eccentric, the filaments unequal, free or connate at the base. Ovary sessile or stipitate, 3-locular. Style short, 3-fid. Ovules solitary in the cells, ascending from the middle of the axis. Capsules 3-gonous, the lobes inflated, membranous, veined, dehiscing loculicidally. Seeds globose, usually arillate at the base, the testa crustaceous. Cotyledons large, transversely folded together.—Much-branched climbing herbs or slender shrubs.

A small genus, belting the world in the tropics.

Flowers ⅛ in. long.
Capsule roundish in outline, 1¼ in. each way . . . . . 1. *C. Halicacabum.*
Capsule obversely deltoid, ⅝ in. each way . . . . . 2. *C. microcarpum.*
Flowers ¼ in. long.
Stem suffruticose, closely grey-downy . . . . . 3. *C. canescens.*
Stem herbaceous, clothed with long spreading hairs . . . . . 4. *C. barbicaule.*

1. **C. Halicacabum,** *Linn.; DC. Prod.* i. 601. Stems annual, slender, herbaceous, deeply sulcate, glabrous or finely grey-downy. Petioles slender, herbaceous, 1–2 in. long. Leaves biternate, the divisions stalked, 1–3 in. broad, with deeply inciso-pinnatifid, ovate segments; texture membranous, colour bright green, surfaces glabrous or a little downy. Flowers in axillary 3-fid umbels, on slender herbaceous peduncles, 2 3 in. long with a pair of opposite spirally decurved tendrils from near the apex. Bracts mi-

nute, linear; pedicels ½–¾ in. long, 2–3-flowered. Male flowers ⅛ in. long, the largest pair of sepals equalling the white petals. Glands roundish. Capsule distinctly stalked, roundish in general outline, 1¼–1½ in. each way, glabrous or slightly pubescent, the seeds round, black, 2 lines broad with a white arillus.—Bot. Mag. t. 1049. *C. hirsutum* and *C. glabrum*, Schum. and Thonn. Pl. Guin. 196–7.

Upper Guinea. Senegambia, *Heudelot! Bidjem!* Guinea, *T. Vogel! Barter!* "A common riverside plant."
Nile Land. Nubia, *Petherick!* Gallabat, *Schweinfurth!* Unyoro, and common everywhere from 7° S. to 2° N. lat., *Speke and Grant!*
Mozamb. Distr. Zambesi-land, *Dr. Meller! Peters*

Everywhere in the tropics. A specimen from Annabon, *Capt. Burton*, with downy stems and leaves, the valves of the capsule not more than ¼ in. broad and umbels not regularly 3-fid, may possibly be *C. molle*, H. B. K.

2. **C. microcarpum,** *H. B. K.; DC. Prod.* i. 601. Stems annual, slender, herbaceous, deeply sulcate, glabrous or finely grey-downy. Petioles shorter than in the preceding, the leaves similarly biternate, the segments generally smaller and more deeply cut; texture membranous, surfaces glabrous or slightly downy. Flowers arranged as in the preceding and similar in size and structure, but the capsule more or less distinctly obversely triangular, not more than ⅝ in. each way.—*C. Halicacabum*, Webb in Fl. Nigrit. 114, in part; Sond. Fl. Cap. 237 (excl. syn.). *C. acuminatum*, Miquel in Linnæa, xviii. 359. *C. microspermum*, E. Meyer in Drége, Pl. Exsicc. *C. truncatum*, A. Rich. Fl. Abyss. i. 101.

Upper Guinea. Senegambia, *Heudelot!* Fernando Po, *Mann!* Guinea, *T. Vogel!*
North Central. Bornu, *E. Vogel!*
Nile Land. Abyssinia, *Dillon!*
Mozamb. Distr. Zambesi-land, *Peters!*

Also a plant of the Cape and Comoro islands, and distributed throughout the tropics.

3. **C. canescens,** *Wall, Pl. Asiat. Rar.* i. 14. *t.* 14. Stems slender, suffruticose, deeply sulcate, finely grey-downy. Petioles short, often scarcely any. Leaves biternate or the lateral divisions reduced so that they appear like pinnæ, the segments ovate, deeply inciso-pinnatifid, the colour a duller green and the texture firmer than in the others, and especially the lower surface always downy, with the main veins a little raised. Peduncles 3–4 in. long, usually much exceeding the leaves, with a pair of opposite, spirally decurved, firm tendrils near the apex, the forks of the umbel 3 or 4, each 2–6-flowered and 1 sometimes branched. Fully developed flowers nearly ¼ in. long, the larger sepals equalling the white petals, the filaments slightly hairy and the glands oblong. Capsule distinctly stipitate, roundish in general outline, measuring 1–1½ in. each way.—Wight and Arn. Prod. Fl. Ind. 109. *C. molle?* Hochst. in Schimp. Pl. Abyss. 761. *C. clematideum* and *C. oblongum*, A. Rich. Fl. Abyss. i. 100.

Nile Land. Abyssinia, *Schimper! Dillon!*

A common E. Indian species.

4. **C. barbicaule,** *Baker.* Stems slender, herbaceous, climbing to a height of 30 ft., deeply sulcate, thinly clothed with fine, spreading, grey

hairs 1½–2 lines long. Petioles 1½–2 in. long, slender. Leaves distinctly biternate, the central division with a stalk more than 1 *in.* long, the segments stalked, ovate, inciso-pinnatifid; texture membranous, colour bright green, upper surface glabrous, under one with tufts of hairs in the axils of the main veins. Peduncles herbaceous, glabrous, 5–6 in. long. Umbels with 6–8 branches, some of them simple, 1–3-flowered, some again umbellate or subpaniculate. Flowers quite ¼ in. long, the larger sepals 2 lines broad, equalling the white obovate petals; filaments ⅛ in. long, white, naked, free. Pistil grey-villose, equalling the stamens. Fruit not seen.

Upper Guinea. Camaroons mountain, at 2000 ft., *Mann!*

Received also and cultivated at Kew from Mr. Monteiro. Agrees with the W. Indian *C. grandiflorum*, Sw., in the size and arrangement of the flowers.

2. PAULLINIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 394.

Flowers irregular, polygamo-dioecious. Sepals 5, concave, imbricated, the 2 upper ones larger and connate. Petals 4, the place of the fifth vacant, furnished with a scale internally, the 2 smaller ones appendiculate, with a scale below the apex. Disk annular, with 4 glands, the 2 which are opposite the smaller petals larger than the other 2. Stamens 8, eccentric, the filaments free or connate at the base. Ovary eccentric, stalked or subsessile, 3-locular. Style 3-fid. Ovules solitary or very rarely 2 in the cells, ascending from the middle of the axis. Capsule stalked, pyriform, 3-gonous or 3-winged above, coriaceous, with 3 septicidal valves. Seeds shortly arillate with a crustaceous testa; embryo curved, rarely straight.—Climbing shrubs.

A large genus; all the species confined to America with this exception.

1. **P. pinnata,** *Linn.; DC. Prod.* i. 604. A wide-climbing shrub with strong, woody, deeply sulcate, glabrous stems. Petioles 1–3 in. long, with a wing ¼–⅜ in. broad upwards, narrowed to the base. Leaves imparipinnate, with 2 pairs of sessile opposite leaflets and a sessile terminal one, the latter obovate-oblong, cuneate at the base, 3–6 in. long by about half as broad, the point acute, the edge with conspicuous, distant, blunt teeth, the side ones similar but shorter; texture subcoriaceous, both sides quite glabrous. Flowers in racemes 3–4 in. long, ¼–⅜ in. broad, with a woody spiral tendril at the base, on long woody peduncles as long as or longer than the racemes. Flowers very numerous, clustered, the clusters sometimes stalked, not more than 1 line long, subglobose, the larger sepals equalling the whitish corolla, the pedicel equalling the flower, both it and sepals a little grey-downy. Capsule woody, turbinate, about 1 in. long by half as broad, quite glabrous, brownish, 3-valved, the valves angled upwards on the back, with a distinct stalk passing gradually into the capsule.—*P. senegalensis*, Juss. in Ann. Mus. iv. 348; DC. l. c. 605; Guill. et Perr. Fl. Seneg. i. 116. *P. uvata*, Schum. et Thonn. Pl. Guin. 195. *P. africana*, G. Don, Gen. Syst. i. 661.

Upper Guinea. Senegambia, *Sieber! Heudelot! Skues!* Guinea proper, *T. Vogel! Barter!* Sierra Leone, *Don, Dr. Kirk!*

Mozamb. Distr. Zambesi-land, *Drs. Meller and Kirk!*

Also a plant of Madagascar and frequent in tropical America. The W. Indian *P. sphærocarpa*, Rich., is given as a native of Guinea by mistake in De Candolle's 'Prodromus.'

3. ERIOGLOSSUM, Blume; Benth. et Hook. f. Gen. Pl. i. 396.

Flowers irregular, polygamo-monœcious. Sepals 5, unequal, roundish, concave, the 2 outer ones smaller than the others, broadly imbricated, in 2 rows. Petals 4, with the place of the fifth vacant, unequal, unguiculate, furnished with a hooded scale above the claw which is crested on the back. Disk unilateral, lobed. Stamens 8, excentric, the filaments pilose, unequal, the anthers slightly exserted. Ovary stalked, obovate-cordate, 3-lobed, 3-celled, the style slender, the stigma obscurely 3-lobed. Ovules solitary, ascending from the base of the cells. Fruit (not seen in the African species) divided to the base into obtuse oblong or subcylindrical, indehiscent lobes. Seeds oblong, exarillate, with a membranous testa. Embryo straight, the cotyledons thick.—Erect trees.

One or two other species, tropical Asiatic.

1. **E. cauliflorum,** *Guill. et Perr. Fl. Seneg.* i. 118. *t.* 28. An erect tree, 15–20 ft. high, with ferruginous young branches. Main petiole about 2 in. long, ferruginous like the branches. Leaves imparipinnate; leaflets in 2–4 sessile, opposite or casually alternate pairs, ovate-oblong, 3–5 in. long by less than half as broad, the point subobtuse, the edge entire, texture subcoriaceous, both sides glabrous, the upper pale green and shining. Flowers in slender, sessile, many-flowered racemes from the old wood, 3–4 in. long, the rachis ferruginous-villose. Bracts ovate, equalling the grey-villose pedicels and calyx, which are both about ⅛ in. long. Petals equal, pink, scarcely exceeding the calyx, ovate-oblong, fimbriated, with a large crested scale. Stamens exserted. Ovary globose-trigonous, woolly, 3-celled, the cells uniovulate.

Upper Guinea. Senegambia, *Perrottet!*

4. SCHMIDELIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 396.

Flowers polygamo-diœcious. Sepals four, in two opposite pairs, membranous, cucullate, broadly imbricated, the two outer ones smaller than the others. Petals 4, small or absent, glabrous or villose internally. Disk unilateral, entire or lobed or with a gland opposite each petal. Stamens excentric or subcentric, included or shortly exserted. Ovary excentric, single and 1-celled or didymous and 2-celled, rarely 3-lobed and 3-celled; style robust, divided sometimes to the base into 2 or 3 lobes. Ovules solitary in the cells, ascending from the base. Cocci of the fruit one or two, turbinate or subglobose, dry and coriaceous or fleshy. Seeds erect, with a short fleshy arillus. Embryo curved, the cotyledons conduplicate.—Trees or shrubs without tendrils.

A large genus belting the world in the tropics, represented most abundantly in America.

Leaves digitately 3-foliolate.

Leaves quite glabrous on both sides when mature.

Inflorescence copiously paniculate.

Central leaflet 4–6 in. long, distantly and bluntly toothed . 1. *S. africana.*
Central leaflet nearly 1 ft. long, subentire . . . . . 2. *S. grandifolia.*
Inflorescence in simple or slightly branched racemes.
Leaflets obovate, blunt, subentire . . . . . 3. *S. alnifolia.*
Leaflets oblong-cuneate, conspicuously inciso-repand . . . 4. *S. repanda.*
Leaflets hairy beneath.
Flowers principally in a copious terminal panicle . . . . . 5. *S. affinis.*
Flowers in axillary simple or slightly branched racemes.
Leaves obovate-cuneate, pubescence short . . . . . 6. *S. rubifolia.*
Leaves oblong-cuneate, pubescence long and spreading . . . 7. *S. magica.*
Leaflets 1- or 2-jugate . . . . . 8. *S. thyrsoides.*
Leaves simple.
Calyx erect.
Leaves membranous, with tufts of hairs in the axils of the veins beneath . . . . . 9. *S. hirtella.*
Leaves coriaceous, both sides quite glabrous.
Base of leaves cuneate . . . . . 10. *S. monophylla.*
Base of leaves rounded . . . . . 11. *S. oblongifolia.*
Calyx reflexed after expansion . . . . . 12. *S. reflexa.*

1. **S. africana,** *DC. Prod.* i. 610. A tree, 30–40 ft. high, with strong woody branches, glabrous or slightly grey-downy when young. Petioles firm, woody, 1–2 in. long. Leaflets 3, nearly sessile, oblong-cuneate, the central one 4–6 in. long by about half as broad, the upper part distantly and bluntly toothed, the cuneate base entire, the point bluntish or subacute, texture subcoriaceous, both surfaces quite glabrous when mature, lower with the main veins raised, and with a tuft of hairs in their axils when young. Flowers in copiously branched, short-stalked, axillary and terminal panicles, the branches racemose, the lower ones 3–4 in. long, the flowers densely crowded upon them, aggregated in clusters of 3–4 each, the axils and pedicels finely grey-downy, the latter about equalling the flowers, which are from $\frac{1}{3}$–$\frac{1}{2}$ line long, the longer sepals equalling the petals, the stamens twice as long. Capsule hard, solitary, blackish, glabrous, globose-turbinate, with a distinct neck, 4–5 lines long.—Guill. et Perr. Fl. Seneg. i. 120. A. Rich., Fl. Abyss. i. 120. t. 27. *Allophilus africanus*, P. Beauv. Fl. Oware, ii. p. 54. t. 107. *S. abyssinicus*, Hochst. in Flora, 1843, 80. *Azamara trifoliata*, Hochst. in Schimp. Pl. Abyss. n. 377. *Ornithrophe tristachyos*, Schum. et Thonn. Pl. Guin. 188.

Upper Guinea. Senegambia, *Perottet!* Guinea proper, *Beauvois, Thonning! T. Vogel! Barter! Irving! Mann!* Sierra Leone, *T. Vogel!*
Nile Land. Abyssinia, *Schimper! Roth! Dillon and Petit!* Kordofan, *Figari, fide Webb.*

Native names "Azamara" and "Souaria."
The Senegambian *S. senegalensis*, Reichb. in Sieb. Exsicc. n. 29, is apparently a variety of this, with subentire leaflets, 1½ in. long, and nearly sessile, simple or 1–2-forked, short spikes. The S. African *S. melanocarpa* and *S. leucocarpa*, are either varieties of the same species or very near to it.

2. **S. grandifolia,** *Baker.* A tree 40 ft. high, with glabrous, terete, strong, smooth, ash-coloured, woody branches. Petiole 4 in. long, quite smooth and woody like the branches. Leaflets 3, nearly sessile, oblong, the central one nearly 1 ft. long, 4–5 inches broad, narrowed gradually from the middle to both ends, the point acute, the edge faintly and remotely denticu-

late in the upper third, texture subcoriaceous, both sides quite glabrous, bright green, the veins beneath slender and not much raised. Flowers in copious elongated panicles on firm, woody, naked peduncles, 2–3 in. long, from the axils of the leaves. Branches laxly racemose, the flowers slightly clustered, the rachis and pedicels a little downy, the latter about equalling the flowers, which are ⅓ line long. Sepals green, glabrous, boat-shaped, much imbricated, rather shorter than the lingulate whitish petals, which are densely villose over the inner surface. Anthers not seen. Immature fruit a round, solitary, blackish, coriaceous, naked coccus.

Upper Guinea. Prince's Island, *Barter!*

A well-marked species.

3. **S. alnifolia,** *Baker.* Branches woody, glabrous, smooth, brown, terete. Petioles firm, slender, glabrous, 1½–2 in. long. Leaflets 3, all obovate-cuneate, the central one short-stalked, 2–2½ in. long by half as broad, the point blunt, the lower two-thirds narrowed gradually, the edge subentire, the lateral ones similar, but smaller and rather unequal-sided, texture subcoriaceous, both sides quite glabrous; veins beneath not raised. Flowers in lax, very slender simple racemes, 3–4 in. long, on peduncles about 1 in. long, from the axils of the leaves; rachis and pedicels nearly glabrous, the latter equalling the glabrous green sepals, the two larger of which are ⅓ line long, broader than long, ultimately spreading or even reflexed. Petals none. Stamens not seen. Ovary globose, grey-villose, with a 2-fid naked style, more than twice as long as the calyx. Fruit not seen.

Mozamb. Distr. Mozambique, *Forbes!*

This comes near the common Mascarene *S. integrifolia*, DC., in many respects, but differs materially in the shape of the leaves.

4. **S. repanda,** *Baker.* A small tree, with glabrous, terete, slender, mottled, brownish, ultimate branches. Petioles 1–1½ in. long, slender, glabrous. Leaflets 3, the central one oblong-cuneate, 2–3½ in. long, 1–1¼ in. broad, broadest about halfway down, the point acute, the edge conspicuously inciso-repand, the lower third narrowly cuneate and entire, with a short petiole, texture membranous, both sides quite glabrous, the upper deep green, the lower paler, the veins fine and but little raised. Flowers in lax slender simple or slightly branched racemes, 3–4 in. long, on slender glabrous peduncles 1–2 in. long, from the axils of the leaves; rachis glabrous or a little downy; the flowers in clusters, those of the lower part with a space between them. Pedicels glabrous, slender, equalling the calyx, which is not more than ⅓ line long. Sepals round, glabrous on the back, green, with a membranous border. Petals none. Ovary grey-villose, the style glabrous, exserted, 2-fid. Stamens and fruit not seen.

Mozamb. Distr. Banks of the Shire and Rovuma, *Drs. Kirk and Meller!*

Gathered also on the Livingstone Expedition on Mohilla Island. Agrees with *S. alnifolia* in the flowers, but the racemes sometimes branched and leaves very different.

5. **S. affinis,** *Guill. et Perr. Fl. Seneg.* i. 121. A tree, 20 ft. high, with woody, finely grey-villose, terete, ultimate branches. Petioles firm, woody, 1–2 in. long. Leaflets 3, nearly sessile, oblong-cuneate, the central one

about 4 in. long by half as broad, the point bluntish, the edge very nearly entire, texture subcoriaceous, upper surface dark green and glabrous, lower finely grey-downy all over with the main veins rather prominent. Flowers in a copious terminal panicle and in smaller axillary ones on firm, woody, finely grey-downy peduncles, 1–2 in. long. Branches racemose, the flowers crowded, about ½ line long. Sepals boat-shaped and ciliated; the petals shorter than the sepals, villose on the inner face. Stamens exserted. Ovaries ovoid, villose. Mature fruit not seen.

Upper Guinea. Senegambia, *Perrottet!* Niger country, ravine near Nupe, *Barter!*

General habit of *S. africana*, from which it differs by its shorter spikes and entire leaflets finely downy beneath.

6. **S. rubifolia,** *Hochst. in Rich. Fl. Abyss.* i. 103. A low tree, with finely grey-downy, slender, terete, ultimate branches. Petioles 1–1½ in. long, slender, downy. Leaflets 3, obovate-cuneate, the central one slightly stalked, 3–3½ in. long by half as broad, broadest more than halfway up, the point subacute, the edge irregularly inciso-repand, the lower third entire and narrowly cuneate, texture membranous, upper surface deep green, nearly glabrous, lower pale green and finely grey-downy all over, the veins not prominent. Flowers in simple or slightly branched racemes, 2–3 in. long, on short downy peduncles from the axils of the leaves. Pedicels equalling or exceeding the calyx, which is ⅓ line long, the sepals boat-shaped, much imbricated. Petals oblong, glabrous, equalling the sepals, with a small villose scale. Cocci 1–2, turbinate, black, coriaceous, ¼ in. long, glabrous when mature.

Nile Land. Abyssinia, *Schimper!*

Mozamb. Distr. Senna, Shiramba and Shupanga, Zambesi-land, *Dr. Kirk!*

The southern species may be distinct. The flowers are nearly sessile, but they are only in a young state, whilst in the Abyssinian the pedicels are, in some of the specimens, twice as long as the flower. In the latter the racemes are all simple, but in the other, considerably branched.

7. **S. magica,** *Baker.* A shrub, 10 ft. high, with slender, terete ultimate branches, thinly clothed with fine, spreading, ferruginous, silky hairs. Petioles slender, 1½–2 in. long, downy like the branches. Leaflets 3, oblong cuneate, the central one short-stalked, 3–4 in. long by about half as broad, broadest more than halfway up, the point acute, the upper half toothed, the lower entire and narrowly cuneate, texture thinly membranous; upper surface full green and glabrous, lower paler and finely loosely downy. Flowers in very lax simple racemes, 3–4 in. long, on pedicels 1–2 in. long, from the axils of the leaves. Pedicels equalling the globose flowers, downy like the main rachis and broadly imbricated boat-shaped sepals. Calyx not more than ⅓ line long. Petals equalling the sepals. Stamens exserted. Cocci 1–2, globose, ¼ in. each way, sessile, scarlet, ultimately glabrous.—*Ornitrophe magica*, Schum. et Thonn. Guin. Pl. 186.

Upper Guinea. Guinea, *Thonning!* banks of the Niger at Nupe and near the confluence, *Barter!*

8. **S. thyrsoides,** *Baker.* A much-branched shrub, with scabrous-punctate branches. Leaves short-stalked, the leaflets 1-jugate, rarely ter-

nate or 2-jugate, stalked, ovate-oblong, 3–6 in. long, the point obtuse, the base cuneate, the edge quite entire, texture subcoriaceous, both surfaces glabrous, the upper shining, the lower with raised veins. Flowers in a terminal panicle, with racemose branches. Sepals 4, two twice the size of the other two. Petals equalling the calyx, ovate, flat, pubescent at the edge. Stamens slightly exceeding the corolla. Berries 2, ovate, nearly as large as a gooseberry, sessile, quite glabrous, purplish, with one large seed the same shape.—*Ornitrophe thyrsoides*, Schum. et Thonn. Guin. Pl. 185.

Upper Guinea. Guinea, *Thonning*.

We have not seen this, and it may not really belong to the genus as here defined.

9. **S. hirtella,** *Hook. f. Fl. Nigrit.* 248. *t.* 25. A small tree, 15–20 ft. high, with slender terete woody branches, shortly grey-downy when young. Petioles ½–1 in. long, erecto-patent, firm, pubescent like the branches. Leaves simple, oblong-cuneate, 6–7 in. long by about half as broad, the apex acuminate or acute, the edge entire or faintly toothed, the base narrowly cuneate, texture membranous, upper surface dark green, both glabrous except that the veins beneath have a tuft of hairs in their axils. Flowers in sessile, close, simple racemes 1 in. or more long from the axils of the leaves; rachis slightly grey-downy; pedicels equalling the globose flowers, which are under ½ line long. Sepals boat-shaped, slightly downy, the petals shorter, obovate-lingulate, densely bearded on the inner face. Stamens not exserted. Coccus solitary, turbinate, black, glabrous, 4 lines long.—*S. monophylla*, Hook. f. Ic. Pl. t. 775, non Presl.

Upper Guinea. Fernando Po, *T. Vogel! Mann!* Ambas Bay and banks of the Bagroo river, *Mann!*

10. **S. monophylla,** *Presl, Bot. Bem.* 40. A small tree, with woody, terete, glabrous branches. Petioles ½–1 in. long, firm, erecto-patent, glabrous. Leaves simple, oblong-cuneate, 3–4 in. long by half as broad, the point subacute, the edge subentire or slightly irregularly repand, texture subcoriaceous, both sides glabrous, bright green, the main veins raised beneath. Flowers in moderately lax simple racemes, 2–4 in. long on firm, woody, naked peduncles about 1 in. long from the axils of the leaves. Pedicels glabrous, equalling or exceeding the calyx, which is ½ line long. Sepals boat-shaped, glabrous. Petals equalling the sepals, lingulate, villose within. Stamens slightly exserted. Ovary with two oblong, slightly hairy divisions; the style glabrous, 2-fid. Ripe fruit not seen.—*Rhus monophylla*, E. Meyer in Drège, Pl. Cap. Exsicc. *S. Meyeri*, Planch. in Herb. Kew. *S. Dregeana*, Sond. Fl. Cap. i. 239.

Mozamb. Distr. Island of Zanzibar, *Bojer! Dr. Kirk!*

Also a plant of Natal, Madagascar, and the Comoro islands.

11. **S. oblongifolia,** *Baker.* A small tree, 20 ft. high, with firm, glabrous, terete, woody branches. Petioles ⅜–1½ in. long, firm, glabrous. Leaves oblong, 5–6 in. long by half as broad, broadly rounded at the base, the point acuminate, the edge quite entire, texture subcoriaceous, both sides quite glabrous, the main veins beneath raised. Flowers in lax, sessile, simple ra-

cemes from the axils of the leaves, sometimes 2 or 3 from the same point. Rachis, pedicels, and sepals ferrugineo-pulverulent, the pedicels equalling the globose flower, which is under ½ line long. Petals 0. Stamens equalling the calyx, the filaments downy. Female flowers and fruit not seen.

Upper Guinea. Sierra del Crystal, *Mann!*

Very near to the E. Indian *S. Allophylus*, DC., but the flowers smaller.

S.? reflexa, *Baker.* A small tree, 15 ft. high, with strong, woody, terete, grey-villose branches. Petioles 3–4 in. long, woody, densely grey-villose. Leaves simple, oblong, 10–12 in. long by about half as broad, narrowed from the middle to both ends, the point acute, the base rounded, the edge quite entire, texture membranous, upper surface glabrous and bright green, lower finely grey-downy on the raised veins. Flowers in lax, subsessile, simple racemes, 2–3 in. long from the axils of the leaves, sometimes 2 or 3 from a point. Axis and pedicels finely grey-villose, the latter equalling the globose flower which is ½ line long. Sepals 4–5, finely downy, bright purple, unequal, roundish or oblong, at first spreading like a cross, finally quite reflexed. Petals 0. Stamens slightly exceeding the petals. Female flowers and fruit not known.

Upper Guinea. Banks of the river Muni, *Mann!*

In the calyx this differs conspicuously from all the other species.

5. CUPANIA, Linn.; Benth. et Hook. f. Gen. Pl. i. 399.

Flowers regular, polygamo-dicœcious. Sepals 4–5 (rarely 3 or 6), broadly imbricated. Petals 4–5 or absent, glabrous or villose, often furnished with one or two scales. Disk equal, annular, tumid, crenate, glabrous or tomentose. Stamens usually 8, but varying from 5–12, inserted beneath the disk, centrical: filaments usually short, glabrous or villose; anthers included. Ovary ovoid or obovoid, 2–3- or rarely 4-celled; style short or elongated, sometimes 2-fid or 3-fid, the stigma simple or lobed. Ovules solitary in the cells, affixed to the axis near the base. Capsule ovoid or obovoid, rarely subglobose, subcarnose crustaceous or bony, 2–4-lobed, 2–4-celled, 2–4-valved, the lobes connate or nearly free. Seeds subglobose or oblong, usually arillate, with a crustaceous or coriaceous testa. Embryo thick, curved, the cotyledons plano-convex, the radicle inflexed.—Trees or erect shrubs.

A considerable genus, with numerous representatives in tropical Asia and America, but only one in tropical Africa.

1. **C. ferruginea,** *Baker.* A climbing shrub 15–20 ft. high, with strong woody branches, densely clothed with spreading, almost bristly, ferruginous hairs ⅛ in. long. Petiole of full grown leaves 3–4 in. long, clothed like the branches. Leaves imparipinnate or abruptly pinnate, with 3 or 4 pairs of sessile or short-stalked, oblong or oblanceolate, erecto-patent leaflets, 2–3 in. apart, the upper pairs 1 ft. long, 3–4 in. broad, the point acute, the base subcuneate, the edge denticulate, texture subcoriaceous, upper surface pale green, glabrous, lower slightly villose upon the midrib and raised veins, ultimately glabrous. Flowers in axillary and copious terminal panicles sometimes 1 ft. long, the rachis and erecto-patent branches rigid and densely fer-

ruginous-bristly, the lower flowers lax, solitary or 2–3 together, nearly sessile, with 1–3 linear ferruginous bracts at the base. Buds hard, oblong; the flowers 2 lines long. Sepals coriaceous, five in number, oblong or lanceolate, equal in length but not so in width, broadly imbricated, densely matted with dark brown pubescence on the back. Petals 5, equalling the sepals, brownish, narrow-oblong, about a line broad, densely grey-villose, without a scale. Stamens equalling the petals, the filaments dilated below, villose, anthers linear. Capsule woody, ½ in. long, 3-lobed, deeply emarginate at the apex, densely ferruginous-bristly.

Upper Guinea. Fernando Po and banks of the Muni river, lat. 1° N., *Mann!*

6. BLIGHIA, Kœnig; DC. Prod. i. 609.

Flowers polygamo-dicœcious, regular. Calyx small, cup-shaped, 4–5-lobed, the lobes valvate or slightly imbricated. Petals 4–5, with a scale from the inner side, usually short, obovate-spathulate, villose. Disk complete, tumid. Stamens 7–10, inserted beneath the disk, centrical; the filaments filiform, usually villose; anthers shortly oblong, much exserted. Ovary substipitate, with 3 angles, 3-celled; style terminal, the stigma 3-toothed. Ovules solitary in the cells, arising from the centre of the axis. Capsule roundish, fleshy, 3-celled. Seeds with a crustaceous testa and large arillus. Cotyledons thick, often curved.—Tall trees.

~~All endemic.~~

Calyx deep-cleft, with oblong sepals, slightly imbricated in bud . .	1. *B. sapida.*
Calyx cleft about halfway down, with deltoid divisions not at all imbricated in bud.	
Leaves 1-jugate	2. *B. unijugata.*
Leaves 2-jugate	3. *B. zambesiaca.*

1. **B. sapida,** *Kœnig; DC. Prod.* i. 609. A tree, 30 ft. high, with strong, woody, grey, sulcate branches, the ultimate ones slightly grey-downy. Petioles under 1 in. long, the rachis 4–6 in. Leaves abruptly pinnate, with 3 or 4 pairs of short-stalked, erecto-patent, opposite leaflets, the upper ones obovate-oblong, 4–6 in. long by half as broad, the point blunt or acute, the base subcuncate, the edge quite entire, the lowest pair much shorter, texture subcoriaceous, both sides pale green, ultimately glabrous, the veins beneath raised. Flowers in short-stalked, simple, axillary racemes, 3–4 in. long, ¾ in. broad. Pedicels 2 lines long, grey, matted, stout, with a broad short green bract at the base. Flowers 2 lines or more long; the five sepals oblong, grey-matted, slightly imbricated in bud; the five petals broader and considerably longer, greenish-white, pubescent within and furnished with emarginate scales more than half their length and broader. Petals and sepals both finally patent. Stamens 7–10, the filaments grey-downy, considerably exceeding the corolla in the male flowers. Capsule roundish in general outline, about 4 in. long, bluntly 3-gonous, fleshy, glabrous, at first yellowish, finally red, with three cells, with a single hard black seed in each as large as a cherry, with a prominent white arillus enveloping the lower half or two-thirds.—*Cupania edulis*, Schum. et Thonn. Pl. Guin. 190. *Akeesia africana*, Tussac. Fl. Ant. i. t. 3. p. 66.

Upper Guinea. Guinea, *Thonning, T. Vogel! Barter!* Prince's Island, *Mann!*
Flowers fragrant and fruit edible, and the distilled water of the flowers used as a cosmetic.

2. **B. unijugata,** *Baker.* A tree, 60 ft. high, with strong, woody, glabrous, grey, terete branches. Petioles 1 in. long, woody, glabrous, with a pair of oblong-cuneate subsessile leaflets at the apex, which are 5–6 in. long, 2 in. or rather more broad, the inner side rather narrower than the outer; apex bluntish, the edge entire, texture subcoriaceous, both sides glabrous, pale green, the upper one rather glossy, the veins beneath raised. Flowers in copious, sessile, moderately close, simple, axillary racemes, about 3 in. long and ¾ in. broad. Pedicels 2 lines long, slender, glabrous, with a short herbaceous bract at the base. Calyx glabrous, herbaceous, ⅛ in. deep, with 5 deltoid lobes that do not reach more than halfway down. Petals 5, whitish, downy, with a large scale. Stamens usually 8, densely grey-villose, twice as long as the calyx; anthers oblong. Fruit unknown.

Upper Guinea. Ambas Bay, *Mann!*
Racemes, leaflets, and stamens closely resembling those of *B. sapida.*

3. **B. zambesiaca,** *Baker.* A tree, with strong, glabrous, terete, woody branches. Leaves mostly 2-jugate, the leaflets short-stalked, the lower pair from near the base of the rachis, both oblong-cuneate, 4–5 in. long by about 1½ in. broad; apex acute; edge entire, texture subcoriaceous, both sides glabrous, the upper one rather glossy, the veins beneath raised. Flowers in subsessile, simple, axillary racemes, 2–3 in. long, ½ in. broad, the lower ones 3–4 together, from a short, acute, herbaceous bract. Pedicels 1–1½ lines long, slender, slightly downy. Calyx 1 line deep, glabrous, green, herbaceous, with 5 deltoid lobes reaching about half down. Petals very minute, whitish, villose. Stamens 8, the filaments filiform, slightly villose as in the preceding, much exserted. Fruit unknown.

Mozamb. Distr. West shore of Lake Nyassa, *Dr. Kirk!*
Closely allied to the preceding.

7. ERIOCŒLUM, Hook. f.; Benth. et Hook. f. Gen. Pl. i. 400.

Flowers regular, polygamo-monœcious. Calyx small, quinquepartite, with valvate or subvalvate divisions. Petals 5, furnished with two scales, which are broader than the lamina. Disk saucer-shaped, membranous, free, with 8–10 crenulations and the same number of ribs radiating from the middle. Stamens 8–10, inserted inside the disk, centrical, the filaments filiform, exserted, naked, the anthers small. Ovary rudimentary in the male flowers, globose, strigose; not seen in the female flowers. Capsule coriaceous, subglobose, hispid, 3-celled, with 3 loculicidal valves, the cells 1-seeded and woolly within. Seed attached to the centre of the axis, not seen mature.—Trees.

Confined to W. tropical Africa.

Flowers in simple racemes . . . . . 1. *E. racemosum.*
Flowers in panicles with racemose branches . . . . . 2. *E. paniculatum.*

1. **E. racemosum,** *Baker.* A small tree, with slender, terete, woody

branches, clothed with spreading ferruginous pubescence. Full grown leaves with 3 or 4 pairs of leaflets, 1½ in. from one another, the lowest sometimes from the base, all oblong-cuneate, with petiolules 2–3 lines long, the upper ones 4–5 in. long, 1½–2 in. broad, the point acute, the edge entire, base cuneate or a little rounded, texture subcoriaceous, upper surface glabrous, lower slightly ferruginous on the midrib, the main veins raised. Flowers in lax, nearly or quite sessile, axillary racemes, 5–6 in. long, the slender axis densely clothed with bright reddish-brown pubescence, the flowers solitary or 2–3 together. Bracts linear, densely ferruginous, about equalling the pedicels which are sometimes as long as the flower, which is about 1 line long. Calyx ⅛ in. broad when fully expanded, densely ferruginous, the five linear-oblong lobes not reaching down to the base. Petals 5, lanceolate, nearly white, exceeding the calyx, the scales densely villose. Disk saucer-shaped, crenulate, membranous, with eight radiating ribs. Stamens 8, much exserted, the filaments nearly naked; anthers subglobose. Fruit unknown.

Upper Guinea. Banks of the Bagroo river, *Mann!*

2. **E. paniculatum,** *Baker.* A tree with strong, woody, terete, sulcate branches densely clothed with spreading, bright reddish-brown, strong, silky hairs. Leaves with 3–4 pairs of nearly sessile oblong-cuneate leaflets, 1 in. or less from one another, the upper ones 4–5 in. long, 1½–2 in. broad, the point acute, the edge entire, the base cuneate or slightly rounded; texture subcoriaceous, colour pale green, upper surface a little glossy, lower finely pubescent on the raised veins and more so on the midrib. Flowers in short-stalked, woody panicles with spreading rigid branches, clothed with dense ferruginous pubescence. Branches racemose, the flowers crowded upwards, the pedicels ⅛ in. long, densely ferruginous. Calyx under 1 line long, narrowly campanulate, the lobes 5, oblong, blunt, not reaching down to the base, densely ferruginous on the back. Petals minute. Disk membranous, saucer-shaped, crenulate, with 10 raised ribs. Stamens 10, slightly exserted. Capsule globose-trigonous, 1 in. long, bony, densely ferruginous-silky.

Upper Guinea. Banks of the Gaboon river, *Mann!*

8. LECANIODISCUS, Planch.; Benth. et Hook. f. Gen. Pl. i. 402.

Flowers regular, polygamo-dicœcious. Sepals 5, roundish, very concave, much imbricated. Petals none. Disk complete, with 10 obscure crenations. Stamens 10, centrical, the filaments filiform, glabrous, much exserted; anthers oblong. Ovary centrical, villose, ovoid, 3-celled, attenuated into a very short style; stigma thick, reflexed, 3-lobed. Ovules solitary in the cells, ascending, affixed to the axis at the base. Capsule ovoid, tomentose, pointed, 1-celled, dry, crustaceous, 1-seeded. Seed erect, ovoid; arillus gelatinous; testa crustaceous and shining. Embryo straight. Cotyledons conferruminate.—Trees.

Confined to tropical Africa.

Racemes 1 in. broad	1. *L. cupanioides.*
Racemes under ½ in. broad	2. *L. fraxinifolia.*

1. **L. cupanioides,** *Planch. in Fl. Nigrit.* 251. A tree 30 ft. high, with strong, woody, finely grey-downy, sulcate branches. Petiole woody, 1½–2 in. long. Leaflets oblong or with a slight obovate tendency, in 4–5 nearly sessile opposite pairs, the upper ones 4–6 in. long, 2–2½ in. broad, blunt or bluntly cuspidate, the base broadly cuneate, the edge entire but slightly crisped; texture membranous, upper surface glabrous, the lower nearly so with the main veins a little raised. Flowers in fascicles in nearly sessile axillary racemes, 4–6 in. long, 1 in. broad. Petioles slender, 3–4 lines long, like the axis slightly downy, with a linear-subulate, deciduous, very downy bract at the base. Buds 1½–2 lines long, the sepals oblong, blunt, finally reflexed and purplish with 2 prominent, grey, vertical ribs on the inside. Petals 0. Stamens 10, unequal, much exserted, naked. Capsule bony, oblong, rather pointed, ½ in. deep, clothed with dense, short, yellowish-grey tomentum.

Upper Guinea. Senegambia, *Heudelot!* Niger country, *T. Vogel! Barter!* Flowers purplish-green, fragrant.

2. **L. fraxinifolia,** *Baker.* A shrub with woody, sulcate, finely grey-downy branches. Petiole about 1 in. long. Leaflets in 5–7 sessile, subopposite pairs, ½–1 in. distant from one another, the full-grown ones oblong-lanceolate, 2–3 in. long, ¾–1 in. broad, the point bluntish or subacute, the base rather rounded, the margin entire; texture membranous, colour pale green, both sides glabrous, the main veins slender and but slightly raised beneath. Flowers fascicled, in nearly sessile axillary racemes, 1½–2 in. long, ⅜ in. broad; pedicels equalling the calyx, which is ⅛ in. deep. Sepals 4–5, oblong, blunt, coriaceous, more or less matted with grey down, usually appressed to the young ovary. Petals 0. Stamens 8–10, much exserted in the male flowers. Ovary flask-shaped, densely grey-downy, crowned by the subsessile, 3-lobed stigma. Capsule broad-oblong, pointed, ⅝ in. deep, the outer shell hard, nearly black, with a thin grey-downy bloom.

Mozamb. Distr. Zambesi-land; Tette, Senna, and banks of the Shire, *Dr. Kirk!*

9. CHYTRANTHUS, Hook. f.; Benth. et Hook. f. Gen. Pl. i. 403.

Flowers polygamous, irregular. Calyx urceolate, coriaceous, oblique, 5-lobed above the middle, the lobes valvate, unequal. Petals 5, unequal, linear-spathulate, slightly exceeding the calyx, with a short scale and subulate process above the claw. Disk annular, pubescent. Stamens 8, within the disk, approximated in 2 bundles; the filaments filiform and pilose; anthers linear-oblong. Ovary 3-lobed, short, tomentose, 3-celled; style 3-fid. Ovules solitary in the cells, erect. Capsule large, orbicular, 3-lobed almost down to the axis, the lobes compressed and coriaceous, the cells hairy. Seed not arillate, orbicular, compressed, with an elongate hilum, the testa coriaceous. Cotyledons conferruminate, adhering to the testa; radicle inconspicuous.—A small tree.

A single species, restricted to W. tropical Africa.

1. **C. Mannii,** *Hook. f. l. c.* A small tree, 15–18 ft. high with strong, terete, glabrous branches. Full-grown leaves 3–4 ft. long, the petiole 1 ft. or more, strong, woody, glabrous, terete; leaflets in 5–7 pairs, erecto-patent, on short corrugated petiolules, the larger ones 15–18 in. long, 3–4 in. broad, oblanceolate or oblong-lanceolate, the point much acuminated, the edge entire, the base cuneate; texture subcoriaceous, colour pale green, both surfaces quite glabrous, the upper glossy, the main veins raised beneath and connected by arching veinlets a space within the edge. Flowers in slightly compound racemes, 3–4 in. long, from the old wood. Calyx 4 lines deep, urceolate, coriaceous, finely matted on the back with very pale brown tomentum, the teeth lanceolate, reaching about a third of the way down. Capsule coriaceous, wrinkled, ferruginous, about 2 in. broad, not quite as long, the 3 valves 1 in. deep.

Upper Guinea. Prince's Island, *Mann!* *Barter!* banks of the river Muni, lat. 1° N., *Mann!*

Fruit edible.

10. SAPINDUS, Linn.; Benth. et Hook. f. Gen. Pl. i. 404.

Flowers polygamous, regular. Sepals 4–5, biseriate, broadly imbricated. Petals 4–5, scaleless or furnished with 1 or 2 scales above the claw. Disk complete, annular. Stamens usually 8–10, centrical, the filaments usually pilose; anthers versatile. Ovary entire or 2–4-lobed, 2–4-celled; style terminal; stigma 2–4-lobed. Ovules solitary in the cells, ascending from the interior angle at the base. Fruit fleshy or coriaceous, usually with 1–2 cocci, which are oblong or globose and indehiscent. Seeds usually globose, exarillate, with a crustaceous or membranous testa. Embryo straight or curved, the cotyledons thick, the radicle incurved.—Trees or shrubs, sometimes climbing.

A considerable genus, principally tropical.

Leaves in 2 pairs. Stamens 8	1. *S. senegalensis.*
Leaves in 4–5 pairs. Stamens 12–15	2. *S. xanthocarpus.*

1. **S. senegalensis,** *Poir.; DC. Prod.* i. 608. A tree 20–30 ft. high with strong, woody, slightly grey-downy branches. Petioles ½ in. long, the rachis not winged; leaflets in 2 short-stalked, erecto-patent pairs about 1 in. apart, which are oblong, 3–4 in. long by about half as broad, narrowed gradually from the middle to both ends, the edge entire, texture subcoriaceous, colour pale green, both sides glabrous with the veinlets in relief. Flowers in copious, terminal, thyrsoid panicles crowded in the upper part of the branches; pedicels equalling the calyx, which is ⅛ in. deep, slightly downy, the 5 sepals oblong or roundish, blunt, unequal, much imbricated. Petals 5, whitish, spathulate, ciliated, with a small densely villose scale. Stamens 7–8, the filaments villose downwards. Capsule usually solitary, turbinate or globose, ½–⅝ in. long, dark purple, fleshy, glabrous.—*S. abyssinicus,* Fresen. in Mus. Senck. ii. 278; A. Rich. Fl. Abyss. ii. 103.

Upper Guinea. Senegambia, *Perrottet!* *Heudelot!* *Brunner!*

Nile Land. Abyssinia, *Rüppell.*

I have not seen the Abyssinian plant, but judging from the description it may be safely referred here.

2. **S. xanthocarpus,** *Klotzsch in Peters' Mossamb. Bot.* 119. Varies from a shrub to a large tree with strong, woody, terete, slightly grey-downy branches. Leaves sessile or nearly so, the rachis narrowly winged with 4 or 5 pairs of nearly sessile oblong leaflets, which are ½–1 in. apart, 1½–2 in. long, ½–1 in. broad, the apex rounded and often emarginate, the edge entire, the base also rounded, texture coriaceous, colour bright green, both sides glabrous, veins and veinlets in relief beneath. Flowers in ample terminal panicles sometimes 1 ft. long, with woody spreading branches and flowers crowded upwards; pedicels very short. Calyx 2 lines long; the sepals 4–5, unequal, oblong, blunt, concave, matted with fine, drab, silky tomentum, white towards the border. Petals spathulate, equalling the sepals in number and length, with a small villose scale above the claw. Stamens 12–15. Fruit subcarnose, 2–3-lobed, the lobes globose, golden-yellow, nearly glabrous when mature.

Mozamb. Distr. From the lower part of the Zambesi along the Shire as far inland as Lake Nyassa, *Peters, Drs. Meller and Kirk!*

Native name N'talala.

11. DEINBOLLIA, Schum. et Thonn.; Benth. et Hook. f. Gen. Pl. i. 405.

Flowers regular, polygamo-monœcious. Sepals 5, roundish, concave, coriaceous, broadly imbricated. Petals 5, obovate or orbicular, equalling or exceeding the calyx, woolly or scaly at the base. Disk complete, annular, elevated. Stamens 8–24, inserted within the disk, uni- or multiserial, the filaments filiform and hairy; anthers linear-oblong. Ovary 2–3-partite to the base, the lobes subglobose, 1-celled, the style thick, central, erect, straight or twisted, with a long stigma. Ovules solitary in the cells, affixed to the axis at the base. Fruit 1–3-lobed, the lobes smooth, globose, coriaceous. Seed globose with a fleshy arillus and coriaceous testa, the cotyledons unequal, thick, plano-convex, the radicle shortly accumbent.—Trees.

Confined to W. tropical Africa.

Stamens 24 . . . . . 1. *D. insignis.*
Stamens 16 . . . . . 2. *D. cuneifolia.*
Stamens 8.
Petals exceeding the calyx . . . . . 3. *D. pinnata.*
Petals equalling the calyx . . . . . 4. *D. laurifolia.*

1. **D. insignis,** *Hook. f. Fl. Nigrit.* 250. A tree 20–25 ft. high with glabrous, terete, strong, woody branches. Petiole 6–8 in. long, the leaflets in about 6 not quite opposite, subsessile pairs, 2–3 in. apart, which are oblong, 8–10 in. long, 3–4 in. broad, the point acute, the base rounded, the edge entire; texture subcoriaceous, both sides pale green and quite glabrous, the veins and veinlets raised beneath. Flowers in copious panicles with subracemose branches, the central one in one of our specimens 2 ft. long; pedicels 1 line or less long, thick, coriaceous. Flowers ¼ in. long; the sepals

oblong, unequal, much imbricated, brownish-drab and rather silky on the back in the dried plant, the edge subscariose. Petals oblong-lanceolate, yellow, slightly ciliated with a large ciliated appendage of the same texture as the petal. Stamens 20–24, equalling the petals in the male flowers, the filaments pubescent. Fruit as in *D. pinnata*.—*D. grandifolia*, Hook. f. l. c.

Upper Guinea. Cape Palmas, *T. Vogel!* Fernando Po, *T. Vogel! Mann!*
Lower Guinea. Congo, *Smith!*

2. **D. cuneifolia,** *Baker.* A shrub with slender, glabrous, terete branches. Petioles 4–5 in. long, slender, woody, the leaflets in about 4 pairs, 2–3 in. from one another, the upper ones oblong, 5–6 in. long, 2–3 in. broad, the point acute or acuminate, the base cuneate, narrowed into a petiolule ¼ in. long; texture subcoriaceous, both sides quite glabrous, the upper bright green, the lower with slender raised veins and veinlets. Flowers in long-stalked axillary racemes 6–12 in. long, the flowers in clusters of 5–6 each; pedicels equalling or exceeding the calyx, which is ⅛ in. deep. Sepals coriaceous, dark green, much imbricated. Petals small, spathulate, with a scale. Stamens 16, equalling the sepals; the filaments filiform, downy. Ovary with 2 rounded lobes. Fruit not seen.

Upper Guinea. Banks of the Bagroo river, *Mann!* Sierra Leone, *Barter!*

3. **D. pinnata,** *Schum. et Thonn. Guin. Pl.* 242. A small tree with strong, woody, glabrous or slightly grey-downy, terete branches. Petiole 2–3 in. long; leaflets in 5–6 short-stalked pairs 1–2 in. apart, oblong, 3–4 in. long, half as broad, the point acute, the base a little rounded, the edge quite entire; texture coriaceous, colour pale green, both sides glabrous or the lower a little silvery with the veins and veinlets in relief. Flowers subsessile, in a dense terminal panicle with short branches, and sessile, shorter, and less compound sessile axillary ones. Calyx ⅛ in. deep, the sepals membranous, glabrous, subrotund, unequal, the centre brown, the edge becoming gradually subscarious. Petals 5, ligulate-oblong, 2 lines long, ciliated, with a large woolly scale at the base. Stamens 8, equalling the corolla in the male flowers, the filaments filiform and densely clothed with white pubescence. Capsule 1–2, roundish, ⅜–½ in. long, crustaceous, orange coloured.

Upper Guinea, *Thonning*; Niger country, *T. Vogel! Irving! Barter!*

4. **D. laurifolia,** *Baker.* A tree with glabrous, terete, slender, woody branches. Petioles 2–3 in. long in the upper leaves, 4–5 in. in the lower ones, the leaflets in about 6 opposite or nearly opposite nearly sessile pairs, oblong, 2–3 in. long by about half as broad, the point acute or acuminate, the base rounded or subcuneate, the edge quite entire; texture coriaceous, colour pale green, both sides quite glabrous, the lower with the veins and veinlets in relief, the main ones connected by anastomosing veinlets a space within the edge. Flowers in a moderately large terminal panicle with spreading woody branches 2–3 in. long, the flowers crowded upwards; pedicels equalling the calyx, which is ⅛ in. long; the sepals the same colour and texture as in *D. pinnata*, roundish and much imbricated. Petals oblong, ciliated, equalling the sepals, with a large woolly scale at the base. Sta-

mens 8, equalling the petals in the male flowers, the filaments filiform, grey-downy. Capsule oblong-turbinate, crustaceous, ½ in. long.

Lower Guinea. Congo, *Smith!*

12. DODONÆA, Linn.; Benth. et Hook. f. Gen. Pl. i. 410.

Flowers unisexual or polygamo-dioecious. Sepals 2–5, imbricate or valvate. Petals 0. Disk obsolete in the male flowers, small in the female ones. Stamens 5–8, centrical, the filaments very short, the anthers linear-oblong, obtusely tetragonous. Ovary sessile, with 3–6 angles and 3–6 cells. Style 3–6-angled, 3–6-fid at the apex. Ovules 2 in the cells, collateral or one above another, ascending or the upper one pendulous. Capsule membranous or coriaceous, 2–6-angled, the cells 1–2-seeded, the angles obtuse or acute or winged on the back, septicidally 2–6-valved, the valves frequently winged on the back, the septiferous column remaining attached after the part that bears the seeds falls. Seeds lenticular or subglobose, exarillate, the hilum sometimes excavated, the funiculus thickened, the testa crustaceous or coriaceous. Embryo spirally twisted.—Trees or shrubs.

A considerable genus, with its headquarters in Australia.

1. **D. viscosa,** *Linn.; DC. Prod.* i. 616. A shrub or small tree, the ultimate branches slender, often subtriquetrous, not at all hairy, more or less viscid. Leaves simple, oblanceolate, 2–4 in. long, ¼–1 in. broad, the apex blunt or subacute, the lower part narrowed very gradually to the base, the edge entire; texture membranous or slightly coriaceous, colour dark green, surfaces not at all hairy but usually more or less viscid, the veins not raised. Flowers in 6–20-flowered terminal panicles, the ultimate pedicels slender, glabrous, ½–¾ long. Sepals glabrous, ligulate-oblong, 1 line long. Capsule ⅜–⅝ in. deep, with 3 broad, glabrous, membranous wings cordate at both ends.—*D. Kohautiana*, Schlecht. in Linnæa, xviii. 36. *D. arabica*, Hochst. and Steud. in Schimp. Pl. Abyss. n. 314; Webb, Frag. Fl. Æthiop. 55.

Upper Guinea. Senegambia, *Sieber! Heudelot!*
Nile Land. Coast of Nubia, *Schweinfurth!* Abyssinia, *Schimper! Parkyns! Dillon and Petit!*
Mozamb. Distr. Zambesi-land, *Dr. Kirk!*

D. repanda, Schum. et Thonn. Pl. Guin. 194, is probably this species, but the leaves are described as ovate and repand. Universally distributed through tropical and south temperate regions.

Turczaninow (Mosc. Bull. 36, 517) describes a *Thouinia? dicarpa* from Sierra Leone, to which he assigns alternate simple leaves, dicarpellary, winged fruit, and solitary 1-flowered peduncles, which we cannot at all identify.

13. BERSAMA, Fresen.; Benth. et Hook. f. Gen. Pl. i. 412.

Flowers hermaphrodite or polygamo-dioecious. Sepals 5, free or 2 more or less connate, imbricated. Petals 5, unequal, imbricated, unguiculate, the lowest the smallest, the claws silky or the apex glandulose. Disk unilateral,

semiannular or subcomplete, elevated. Stamens 4–5, centrical, inserted within the disk, all connate or the 2 front ones connate at the base. Ovary oblong, subterete, 4–5-celled. Style elongated, curved; stigma pyramidal, truncate. Ovules solitary, erect from the base of the cells. Capsule globose, woody, 4–5-celled, dehiscence loculicidal; valves septiferous at the middle. Seeds arillate, albumen dense; embryo straight.—Trees and shrubs.

Confined to Africa, 2 species occurring at the Cape.

§ *Eubersama.* Stamens all connate at the base.
Rachis of leaves broadly winged upwards . . . . . 1. *B. maxima.*
Rachis of leaves not winged . . . . . 2. *B. abyssinica.*
§§ *Natalia.* (Hochst. Flora, 1841, 663; Rhaganus, E. Meyer in Herb. Drége.)
Only the lower stamens united . . . . . 3. *B. paullinioides.*

1. **B. maxima,** *Baker.* A tree 25 ft. high with strong woody branches, finely grey-downy when young. Petiole strong, woody, 3–4 in. long. Stipules ovate-acuminate, coriaceous, glabrous on the back, 1½–3 in. long, clasping the base of the petiole and connate inside it as in the other species. Full-grown leaf 2½–3 ft. long, imparipinnate, with 6–7 pairs of sessile oblong leaflets 2–3 in. apart, narrowed gradually to both ends, the point acute, the base subcuneate, the edge entire, the rachis between the upper ones with a wing ¼ in. broad on each side; texture membranous, both sides quite glabrous. Flowers hermaphrodite in a dense raceme 1 ft. long, 1½ in. broad, on a strong woody peduncle 3–4 in. long, which, like the axis, is densely grey-downy; pedicels 3–4 lines long, with linear silky bracts at the base about half as long. Calyx ¼ in. deep, campanulate, coriaceous, densely brownish-grey-silky on the back, the teeth oblong-deltoid, reaching about halfway down, unequal, the lowest 2-fid. Petals ligulate-oblong, three times as long as the calyx, glabrous upwards, the claw silky, finally reflexed, the lowest much smaller than the others. Stamens 4, monadelphous, equalling the corolla. Style elongated, equalling the stamens, sometimes twisted. Capsule globose, bony, 1 in. long, 4-valved, finely downy.

Upper Guinea. Corisco island, *Mann!*

2. **B. abyssinica,** *Fresen. in Mus. Senck.* ii. 280. *t.* 17. A tree with strong woody terete branches, the young ones a little grey-downy. Petioles 1–2 in. long, with an ovate-acuminate scarious stipule ½–¾ in. long. Leaves imparipinnate with usually 4 pairs of slightly stalked oblong-lanceolate leaflets ½–1 in. apart, which are 2–3 in. long by less than half as broad, the point acute or acuminate, the edge more or less distinctly serrated upwards, the rachis not winged; texture subcoriaceous, both sides quite glabrous, the upper rather glossy, the veins fine beneath and scarcely raised. Flowers in dense axillary racemes, 4–8 in. long, 1 in. broad when expanded, on woody peduncles 2–3 in. long; pedicels 1 line long, stout, grey-silky. Bracts small, lanceolate. Calyx campanulate, grey-silky, 4 lines deep, with 5 unequal oblong divisions reaching about halfway down. Petals 5, ligulate-spathulate, twice as long as the calyx, densely and finely silky, finally reflexed. Stamens 5, in the male flowers nearly as long as the petals, the filaments silky downwards and monadelphous. Capsule subglobose, bony,

4-valved, ½–¾ in. deep.—*B. integrifolia*, Rich. Fl. Abyss. i. 107. *t.* 26. *B. serrata*, Rich. l. c.

Nile Land. Abyssinia, *Schimper! Dillon and Petit!* and others.

Native name 'Bersama.'

Also a plant of Natal.

The two names of the 'Flora Abyssinica' evidently only represent the fully developed male and female forms of one species.

3. **B. paullinioides,** *Baker.* A tree 30 ft. high with terete finely sulcate branches, very slightly grey-downy when young. Petioles 1–3 in. long with an ovate-acuminate stipule at the base ½–½ in. long, densely grey-silky on the back. Leaves imparipinnate, 6–12 in. long, with 7–10 pairs of slightly stalked oblong leaflets, which are 2–4 in. long, about half as broad, the point acute, the edge faintly toothed, the base subcuneate or slightly rounded; texture membranous, both sides quite glabrous, the upper dark green, the lower paler, veins not raised. Flowers in moderately dense axillary racemes, 3–6 in. long, 1 in. broad, on glabrous woody peduncles 2–3 in. long. Pedicels 2–3 lines long, grey-silky with a minute subulate bract at the base. Calyx campanulate, dark green, grey-silky, with 4 oblong lobes reaching halfway down, the lowest emarginate. Petals white, twice as long as the calyx, ligulate with a small scale, the lowest much narrower than the others. Stamens 4, the filaments dilated downwards, only the 2 lower ones connate at the base. Ovary ovoid, densely grey-silky, narrowed gradually into the style. Fruit unknown.—*Natalia*, Planch. in Fl. Nigrit. 252. t. 29.

Upper Guinea. Sierra Leone, *T. Vogel! Barter!* Fernando Po, *Mann!*

Order XLV. ANACARDIACEÆ (by Prof. Oliver).

Flowers small, regular, unisexual, polygamous or hermaphrodite. Calyx usually 3–4–5-fid or -partite, in a few genera (not African) accrescent. Petals as many as and alternate with the calyx-lobes, free, rarely 0. Disk annular, flat or cup-shaped, entire or lobed, sometimes inconspicuous. Stamens as many as and alternate with the petals or twice as many, rarely more numerous (*Sorindeia, Sclerocarya*); filaments free; anthers basi- or dorsi-fixed, dehiscing longitudinally. Ovary, in female flowers, 1-celled (*Anacardieæ*) or 2–5-celled (*Spondieæ*); in male flowers 0, rudimentary or 3–5-fid. Styles 1–4 or stigma subsessile. Ovules solitary (in pairs in *Sclerocarya*, Kirk), pendulous or suspended from a basal funicle or laterally affixed. Fruit free, usually drupaceous, 1–5-celled, 1–5-seeded. Seed almost invariably exalbuminous, with fleshy plano-convex cotyledons and a short radicle.—Trees or shrubs, often abounding in a caustic or resinous juice. Leaves alternate, frequently crowded toward the ends of the branches, exstipulate, 3-foliolate or unequally pinnate, rarely simple. Inflorescence various.

A large family of tropical and warm countries, common to both hemispheres. Six of the following genera are peculiar to Africa. Several species remain very imperfectly known, and some, of which we have insufficient examples, are undescribed here, though sometimes incidentally referred to under their respective genera or apparent allies.

Ovary 1-celled (*Anacardieæ*).
- Leaves simple or 3-foliolate (in African species). Petals imbricate, 4–6. Styles 3, free or connate . . . . . 1. RHUS.
- Leaves pinnate. Petals valvate or subvalvate. Ovule suspended near middle of cell . . . . . 2. SORINDEIA.
- Leaves simple. Antheriferous stamens 1 or 2. Style 1 . . 3. MANGIFERA.
- Leaves simple. Stamens 10, few or all antheriferous. Style 1 4. ANACARDIUM (cult.).
- Leaves pinnate. Flowers 3-merous. Petals imbricate. . . 5. HÆMATOSTAPHIS.
- Leaves pinnate. Flowers 4–5-merous. Petals valvate . . 6. TRICHOSCYPHA.
- Leaves pinnate. Flowers 4–5-merous, racemose. Petals imbricate . . . . . 7. ODINA.

Ovary 2–5-celled (*Spondieæ*).
- Leaves pinnate. Stamens 8–10. Styles 4–5 . . . . . 8. SPONDIAS.
- Leaves pinnate. Stamens 12–24 . . . . . 9. SCLEROCARYA.
- Leaves pinnate. Stamens 8–10. Style short with 3-lobed stigma . . . . . 10. HITZERIA.
- Leaves 3-foliolate. Stamens 8 . . . . . 11. LANNEOMA.

1. RHUS, Linn.; Benth. et Hook. f. Gen. Pl. i. 418.

Flowers small, regular, polygamous. Calyx 4–6-partite, persistent; segments equal. Petals as many, spreading or erect, imbricate in æstivation. Stamens as many and alternate with the petals or 10, free, inserted in the annular disk; filaments subulate; anthers in the female flower usually rudimentary. Ovary sessile, globose or ovoid. Styles 3, free or connate, erect or appressed to the ovary. Ovule suspended from a basal funicle. Drupe usually small, dry or resinous.—Trees or shrubs, often abounding in resin. Leaves simple or 3-foliolate in the tropical African species, alternate or rarely opposite or verticillate. Panicles axillary and terminal, usually many-flowered.

A large genus of both hemispheres, with numerous (about 50) species at the Cape. All but three of the following species appear to be peculiar to tropical Africa.

Leaves simple.
- Leaves alternate, 4–10 in. . . . . 1. *R. pulcherrima.*
- Leaves subternate, 2–5 in. . . . . 2. *R. insignis.*

Leaves 3-foliolate.
- Leaves glabrous or finely puberulous.
  - Leaflets obtuse . . . . . 3. *R. glaucescens.*
  - Leaflets oval or linear-lanceolate, acuminate or acute, lateral petiolulate. Panicles rather lax . . . . . 4. *R. retinorrhœa.*
  - Leaflets oval, acute or obtuse, not acuminate, lateral subsessile. Panicles short, rather dense or glomerate . . . . . 5. *R. glutinosa.*
  - Leaflets elongate, linear (3–6 in.), subobtuse, mucronate . . 6. *R. viminalis.*
- Leaves tomentose or pubescent beneath.
  - Leaflets oval or oblanceolate, obtuse or acute, pubescent and not reticulate above. Panicles shorter than leaves . . . . . 7. *R. abyssinica.*
  - Leaflets obovate, broadly rounded or apiculate, glabrous or glabrescent and minutely reticulate above . . . . . 8. *R. villosa.*
  - Leaflets oval, acute, on short broadish petioles. Panicle terminal, rigid, exceeding the leaves, with sessile flowers on the short interrupted lateral ramuli . . . . . 9. *R. Kirkii.*

1. **R. pulcherrima,** *Oliv.* Young shoots pubescent-hoary or early glabrous. Leaves ample, simple, alternate, oblong-elliptical or broadly oblong, obtuse or retuse, mucronate, glabrous or, at least at first, minutely

hoary above, paler or silvery with minute tomentum beneath; midrib and lateral veins as in *R. abyssinica;* 4–10 in. long, 2–5 in. broad; petiole ¼–1 in. or leaves subsessile. Panicles small, terminal or in axils of upper leaves. Flowers polygamous. Pedicels hoary, shorter than or equalling the calyx. Calyx-lobes ovate-lanceolate. Petals oblong, erect, with inflexed tips, twice as long as the calyx. Stamens of male and hermaphrodite flowers inserted round a lobed cupuliform fleshy disk. Styles short, erect, with recurved tips.—*Anaphrenium pulcherrimum*, Schweinf. Fl. Æthiop. 32,

Nile Land. White Nile, *Murie!* Sennar, *Cienkowski.* Gallabat, Abyssinia, *Schweinfurth!*

2. **R. insignis,** *Delile (Ozoroa) in Ann. Sc. Nat. Ser.* 1. xx. 91. *t.* 1. *f.* 3. A spreading tree or shrub. Extremities at first minutely pubescent or hoary-tomentose. Leaves simple, approximate in threes, rarely alternate, elongate-oval oval-oblong or oblanceolate, acute or obtuse, mucronate, entire, glabrous above, whitish-hoary or silvery beneath, with a closely appressed or obsolete tomentum; midrib prominent; lateral veins numerous and parallel, 2–5 in. long, ⅓–1½ in. broad; petiole ⅓–1 in. Flowers in small, terminal, more or less leafy, pubescent or hoary, many-flowered panicles, sometimes shorter than, sometimes considerably exceeding the leaves. Calyx-lobes ovate. Petals oblong, erect, with incurved tips 3 or 4 times longer than the calyx. Styles short, erect, with recurved stigmatic apices. Fruit black, resinous, ⅓–½ in. in diam.—Ferret and Galinier, Atlas (Bot.), t. 9. *Anaphrenium abyssinicum*, Hochst. in Flora, 1844, 32; *Heeria*, Meiss. Gen. Pl. part 1. p. 75.

Upper Guinea. Senegal, *Sieber! Bidjem!*
Nile Land. Abyssinia, *Schimper, Dillon!* Sennar, *Cienkowski.*
Lower Guinea. Congo, *Smith!*
Mozamb. Distr. Zambesi and Luabo rivers, *Dr. Kirk!* Rovuma river, *Dr. Meller!*

Var. β. *latifolia.* Nupe, Niger, *Barter!*

Var. γ. *obovata.* Leaves about 2 in. long, 1–1½ in. broad, rounded or retuse at apex, cuneate at base.—Zambesi, *Dr. Kirk!* Mozambique, *Forbes!*

Nearly allied to *Rhus mucronifolia*, Sond. Fl. Cap. i. 521, if, indeed, specifically distinct. The leaves, however, are nearly always ternately verticillate.

3. **R. glaucescens,** *Rich. Fl. Abyss.* i. 143. Wholly glabrous or the extremities panicles and petioles puberulous or finely pubescent. Leaves 3-foliolate, coriaceous or membranous; leaflets from oval to lanceolate or obovate-elliptical, obtuse or exceptionally subacute, often mucronate, narrowed to the base, entire obscurely undulate or broadly crenulate-dentate, rarely with the midrib and petiole puberulous; median leaflet usually 1½–4 in. long, ½–1½ in. broad; petiole ½–1½ in. Panicles axillary, usually considerably shorter than the leaves, moderately lax and divaricate, glabrous or hairy; pedicels equalling or shorter than the flowers. Petals ovate, obtuse, twice as long as the calyx-lobes. Fruit 2–3 lines in diam., roundish-obovoid.—*R. undulatum*, Rich. l. c. 145. *R. crenulatum*, Rich. l. c. 142. *? R. Quartinianum*, Rich. l. c. 141. *R. Gueinzii*, Sond. Fl. Cap. i. 515. *R. Kotschyana*, Fenzl (sine descr.) in Flora, 1844, 312.

Nile Land. Mountains of Abyssinia, *Schimper!* and others; Madi, *Grant!* Sennar, *Kotschy!*

Mozamb. Distr. Zambesi, *Dr. Kirk!*

Var. *Schimperi* (Hochst. Pl. Schimp. Abyss. n. 2188). Panicles confluent, leafy towards the ends of the branches.

Abyssinia, *Schimper!*

A specimen allied to this species, from the "Red Sea" (*Nimmo*), in fruit, is in the Kew herbarium.

Occurs also at Natal.

Rhus glaucum, Hochst. We have an imperfect specimen so labelled, collected in Abyssinia by Dillon and Petit. It is doubtfully distinct from *R. glaucescens*.

4. **R. retinorrhæa,** *Steud. in Pl. Schimp. Abyss. n.* 1627. Tree or shrub, wholly glabrous. Leaves 3-foliolate, firmly membranous or thinly coriaceous; leaflets oval- or linear-lanceolate, more or less (often finely) acuminate, narrowed at the base and usually distinctly petiolulate, entire or obscurely denticulate; lateral nervures rather prominent above when dry, slightly or not at all paler beneath; median leaflet from 2–6 in. long, ½–1 in. broad; petiole 1½–2 in. Flowers pedicellate, in axillary or terminal, moderately lax, many-flowered panicles usually much shorter than the leaves. Petals elliptical, twice as long as the small roundish-ovate calyx-lobes. Fruit with shining, thin, coriaceous epicarp, about 1½–2 lines in diam.—*R. viminale*, Rich. Fl. Abyss. i. 142.

Nile Land. Mountains of Abyssinia, *Schimper!* and others.

5. **R. glutinosa,** *Hochst.; Rich. Fl. Abyss.* i. 144. Wholly glabrous or the young shoots and panicles puberulous. Leaves 3-foliolate, rather coriaceous; leaflets oval or lanceolate-oblong, obtuse and mucronate or acute, scarcely or not at all acuminate in our specimens, narrowed to the base; midrib beneath glabrous or minutely pubescent; 3–6 in. long, 1½–2 in. broad; petiole 1½–2½ in. Panicles rather dense, axillary, usually shorter than or not exceeding the petioles, or terminal and rather longer. Pedicels shorter than or equalling the flowers. Petals roundish or broadly elliptical, about twice as long as the ovate calyx-lobes. Fruit nearly ¼ in. in diam.

Nile Land. Mountains of Abyssinia, *Schimper! Dillon and Petit!*

R. Petitianum, Rich. l. c. 144, known to me only by description, must be very near to this plant, if, indeed, specifically distinct.

6. **R. viminalis,** *Vahl; DC. Prod.* ii. 70. Wholly glabrous. Leaves coriaceous, 3-foliolate; leaflets elongate-linear-lanceolate, mucronate, but usually scarcely acute, narrowed to the base, subsessile or scarcely petiolulate, entire, reticulate above, distinctly paler beneath, usually 3–6 in. long, ½–½ in. broad; petiole ¾–1½ in. Flowers small, on short slender pedicels, in axillary panicles shorter than or exceeding the petioles, occasionally terminal and rather longer. Fruit as in *R. retinorrhæa*, 2–3 lines in diam. when dry.

South Central. Highlands of Batoka country, *Dr. Kirk!*

Dr. Kirk says the fruit is eaten. *Rhus viminale* of Richard in 'Flora Abyssinica,' I refer to *R. retinorrhæa*.

7. **R. abyssinica,** *Hochst. in Schimp. Pl. Abyss.* Branches tomentose or shortly pilose. Leaves 3-foliolate; median leaflet oblanceolate or oval,

obtuse or acute, pubescent, with the minute venation obscure above, cinnamon-tomentose or -pubescent-tomentose beneath; 2–4 in. long, 1½–2 in. broad; petiole 1–2 in. Flowers very shortly pedicellate or subsessile in axillary and terminal hairy panicles shorter than the leaves. Petals ovate, obtuse. Fruit about ¼ in. in diam.

Nile Land. Mountains of Abyssinia, *Schimper!* Nubia (*Schweinf. et Asch. Enum.*).

I have not seen *R. foliosum*, Rich. Fl. Abyss. i. 143. It may be identical with the above.

8. **R. villosa,** *Linn. f.; DC. Prod.* ii. 70. Branches pubescent or shortly pilose, occasionally with axillary thorns. Leaves 3-foliolate; leaflets obovate to oblanceolate, obtuse, entire, often apiculate; reticulate, glabrescent or thinly hairy above, pubescent or somewhat tomentose beneath, with the midrib and principal veins rather prominent; median and larger leaflet usually 1–3 in. (rarely 4–5 in.) long, ¾–1¾ in. broad (in the Cape form frequently much smaller). Panicles hairy, axillary (often subracemose) and shorter than the leaves or terminal and produced beyond. Pedicels equalling or shorter than the flowers.—Fruit glabrous.—*R. pyroides*, Rich. Fl. Abyss. i. 145.

Nile Land. Abyssinia, *Petherick! Schimper!* Upper Nile (*Schweinf. et Asch. Enum.*).
Mozamb. Distr. Manganya hills, *Dr. Meller!*

Var. β. *tomentosa.* Leaves densely tomentose beneath. Abyssinia, *Roth!*
Also at the Cape.

Var. γ. *grandifolia*, near Mombane, 4000 ft., *Dr. Kirk!*
A variety with leaves finely pubescent on the midrib and margin. Zanzibar!

9. **R. Kirkii,** *Oliv.* Branches covered with a short cinnamon-coloured tomentum. Leaves coriaceous, 3-foliolate, shortly petiolate; median leaflet oval, ¼–½ longer than the lateral leaflets, narrowed to each end, acute or subacute, lateral sessile, all obtuse or narrowly rounded at the base, reticulate with paler venation and early glabrous above, softly rusty- or cinnamon-tomentose beneath; median leaflet about 2–4 in. long, ¾–1⅓ in. broad; petiole ½ in. more or less, broadly channelled above. Flowers sessile, fascicled on short lateral ramuli of the principal branches of sparsely divided, rather rigid and erect terminal leafless or nearly leafless tomentose panicles; bracts usually linear, tomentose, exceeding or falling short of the flowers. Petals scarcely twice as long as the calyx, elliptic-oblong.

South Central. Near Victoria Falls, Batoka country, *Dr. Kirk!*

2. **SORINDEIA,** Thouars; Benth. et Hook. f. Gen. Pl. i. 419.

Flowers small, polygamous or dicœcious. Calyx 4–5(–3)-toothed, cup-shaped. Petals as many as calyx-teeth, valvate or slightly imbricate at the tips. Male fl.: Stamens 10–20, occupying a central disk or (§ *Oligandra*, Planch. ms. in Herb. Kew) as many or twice as many as the petals, inserted around the disk. Ovary 0. Hermaphrodite or female fl.: Stamens or staminodia normally as many as the petals. Ovary sessile; style thick or 0; stigma with 3–4 shortly recurved adnate lobes. Ovule suspended near the middle of the cell. Fruit drupaceous. "Embryo with thick fleshy cotyle-

dons and a lateral ascending radicle."—Glabrous trees or shrubs. Leaves alternate, unequally pinnate; leaflets entire. Panicles terminal, axillary or from the old wood, often lax and divaricate, many-flowered.

A small genus, confined to tropical Africa and Madagascar. Of several of the species we have only male flowers, and it is not improbable that those with iso- or diplostemonous stamens, may prove generically distinct from the original *S. madagascariensis* and *S. juglandifolia*.

Leaves 1–5–7–11-foliolate, ½–1½ ft. long.
- Flowers 4–5-merous.
  - Ovary narrowed into style. (Stamens of ♂ fl. 10–20, scattered on disk.)
    - Panicles terminal or axillary. Leaflets with an oblique spurious vein from the axils of the lateral nerves . . 1. *S. juglandifolia.*
    - Panicles lateral or from old wood, fascicled. Venation anastomosing, without the oblique vein as above . . . 2. *S. madagascariensis.*
  - Stigma sessile (♂ fl. unknown) . . . . . 3. *S. patens.*
- Flowers 3-merous (♀ fl. unknown) . . . . . 4. *S? trimera.*

Leaves multifoliolate, 2–4 ft. long.
- Leaflets distinctly acuminate. Flower 4-merous. Anthers much shorter than filaments . . . . . 5. *S. Mannii.*
- Leaflets with short acumen or apiculate. Flowers 5-merous.
  - Anthers equalling the filament . . . . . 6. *S. longifolia.*

1. **S. juglandifolia,** *Planch. in Herb. Kew.* Wholly glabrous. Leaves unequally pinnate; leaflets 1–7–11 or more, coriaceous, usually alternate, petiolulate, oblong-elliptical, the terminal and upper rather larger tending to obovate, obtuse with a short acumen or apiculus, entire, with a more or less distinct coriaceous marginal nerve; midrib and lateral nerves rather prominent, the reticulation confluent into more or less distinct oblique veins from the axils of the lateral nerves; 1½–3½(–6) in. long, ¾–1¼(–3) in. broad; petiolule 1–3 lines. Panicles terminal or subterminal, erect, exceeding the leaves with successively shorter racemose lateral branches. Flowers 1½–2 lines, subsessile or on short pedicels, 5-merous. Calyx cupuliform, shortly and broadly 5-toothed. Petals oblong. Stamens of male flowers 15–20; anthers linear-oblong, exceeding the filament. Ovary glabrous, narrowed into the style; stigma with 3–4 very short recurved adnate lobes. Ovule inserted near the middle of the cell.—*Dupuisia juglandifolia,* Rich. in Fl. Senegamb. i. 148. t. 38. *Sapindus simplicifolius,* Don, Gard. Dict. i. 666, *fide* Benth. in Fl. Nigrit. 286.

Upper Guinea. River Nuñez, Senegambia!
Lower Guinea. Congo, *Burton!*

Var. *divaricata.* Leaflets larger, up to 4–6 in. long; panicles lax, widely divaricate, pedicels (♂) slender, equalling or exceeding the flowers (*S. heterophylla,* Hook. f. Fl. Nigrit. 286).—Sierra Leone, *Don! Oldfield!* Bagroo river (a climbing shrub), *Mann!*

Oldfield says the fruit is eaten. The Congo specimens are altogether smaller and the leaflets more numerous than in the Senegambian plant, but the differences are such as station might easily occasion. I have not seen unifoliolate specimens myself.

This is probably the undescribed *Sorindeia africana* (DC. Prod. ii. 80), referred to by R. Brown in Tuckey's Congo, App. 431.

2. **S. madagascariensis,** *DC. Prod.* ii. 80. A tree, often of large size, wholly glabrous. Leaves unequally pinnate, more or less coriaceous;

leaflets 7–9–11, oblong or oblong-elliptical, the terminal often obovate, shortly and obtusely acuminate or apiculate, base usually somewhat cuneately narrowed to the petiolule, reticulate beneath with prominent midrib and lateral nerves, 3–8 in. long, 1–3 in. broad; petiolules 1–4 lines. Panicles fasciculate, confusedly and divaricately branched, lateral or from the old wood, often 1–2 ft. long, dependent in fruit. Pedicels equalling or shorter than the flowers. Calyx broadly 5-dentate. Stamens of male flower 15–20, of hermaphrodite 5–7, with or without additional anantherous staminodes. Style very short and thick; stigma with 3 very short recurved lobes. Fruit the size of a "sparrow's egg," yellow, "sweet, with the taste of turpentine."

Mozamb. Distr. Zanzibar and E. tropical Africa, lat. 7° S., *Speke and Grant!*

Speke and Grant mention a tree having a trunk 8 ft. in circumference.
Also in Madagascar and cultivated in tropical Asia.

3. **S. patens,** *Oliv.* A glabrous climbing shrub, attaining 30 ft. Leaves 5–7-foliolate; leaflets scattered, rather coriaceous, oval-oblong, rather narrowly but obtusely acuminate, narrowed to the base, concolorous; lateral nerves scarcely prominent and venation obscure beneath, the under surface sparsely minutely tubercled or granulate; 5–6 in. long, 1½–2 in. broad; petiolule 2–4 lines. Panicles terminal or subterminal, with few divaricate or deflexed interruptedly racemose branches. Pedicels (of female flower) about equal to the flowers, which are 1½–2 lines in diam. Calyx-lobes 4 (rarely 5), deltoid. Petals convexly spreading, ovate, with somewhat revolute margins. Stamens (effete? or staminodes) 4(–5), alternate with the petals, exterior to the disk. Stigma sessile, 3-lobed; lobes short, divergent, grooved above and adnate to the ovary. Ovule suspended from a little above the middle of the cell.

Upper Guinea. Corisco Bay, *Mann!*

4. **S.? trimera,** *Oliv.* A glabrous tree of 30 ft. (*Mann*). Leaves unequally pinnate, 5–7-foliolate. Leaflets coriaceous, shining above, lateral opposite, terminal larger, elliptical or oblong-elliptical, shortly pointed or acuminate, rounded or broadly cuneate at base; midrib and distant curving lateral nerves prominent below, reticulation subprominent, 5–7 in. long, 2½–3½ in. broad; petiolules ¼–½ in. Panicles fascicled toward the extremities of the branches, shorter than the leaves in our specimens, with the (male) flowers irregularly clustered; pedicels equalling the flowers or flowers subsessile. Calyx 3-fid; lobes broadly ovate. Petals 3, broadly ovate, obtuse, valvate. Stamens 6, around a radiately corrugated disk; anthers small, ovoid, much shorter than the filaments. Female flowers not seen.

Upper Guinea. River Kongui, W. tropical Africa, *Mann!*

A specimen in fruit only, labelled "Balsam of St. Thomas," from a tree 60–80 ft. in height, sent by Mr. Mann from the Island of St. Thomas (3000 ft. above the sea), closely resembles this, and is probably the same. The fruit is imperfect, apparently spherical, smooth, with a coriaceous epicarp, and about 1 in. in diam.

The opposite leaflets and 3-merous diplostemonous flowers of *S.? trimera* indicate generic distinction, but the female flowers are yet unknown.

5. **S. Mannii,** *Oliv.* A glabrous tree. Leaves 3–4 ft. long, multifo-

liolate; leaflets coriaceous, oblong, the lower ovate-elliptical or -oblong, distinctly acuminate, slightly paler beneath, with a prominent midrib and curving lateral nerves; 5–10 in. long (the lower smaller), 2–2½ in. broad; petiolules 3–4 lines. Panicles glandular-puberulous, probably from below the leaves, ½–1 ft. long, with divaricate, racemose, lateral branches. Pedicels equalling or shorter than the flower. Flowers 4-merous. Calyx-lobes broadly deltoid. Petals slightly imbricate at the tips. Stamens 4 on the outside of a plicate pubescent disk; anthers small, ovoid, much shorter than the filaments. Female flowers not seen.

Upper Guinea. Corisco Bay, *Mann!*

Mr. Barter sent, from Lagos, a specimen of a tree allied to this, or perhaps identical with it, bearing male flowers, clustered in short panicles, 1 or 2 in. in length. I cannot, with our imperfect material, either make a distinct species of it or unite it.

6. **S. longifolia,** *Oliv.* A large glabrous tree. Leaves 2–3 ft. long, unequally pinnate, multifoliolate; leaflets coriaceous, oblong or oblong-lanceolate, with a short obtuse apiculus, green above, red-brown beneath when dry, the midrib and straight lateral nerves (arching at their extremities), prominent beneath, with obscure venation; 6–9 in. long, 1½–2 in. broad; petiolule 2–4 lines. Panicles rusty-puberulous, fasciculate or much branched below, from the branches below the leaves or on the old wood. Flowers subsessile or pedicels shorter than the flowers. Calyx with 5 deltoid teeth. Stamens 5, alternate with the petals, around a hirsute disk; anthers elliptical-oblong, rather coriaceous, equalling the filaments. Female flower not seen.—*Dupuisia? longifolia*, Hook. f. Fl. Nigrit. 287. *Sorindeia (Oligandra) macrophylla*, Planch. in Herb. Kew.

Upper Guinea. Sierra Leone, *T. Vogel!*

3. MANGIFERA, Linn.; Benth. et Hook. f. Gen. Pl. i. 420.

Flowers polygamous or dicœcious. Calyx 4–5-partite or lobed, unaltered in fruit. Petals 4–5, imbricate in æstivation, the median line often thickened below, on the inner side, into a prominent ridge. Stamens 1 or 4–5, 1 or 2 antheriferous. Ovary free, sessile, 1-celled, with a lateral style; "ovule ascending." Drupe fleshy, with a fibrous or woolly endocarp.—Trees. Leaves alternate, simple, entire, coriaceous. Panicles terminal.

A small genus of India and the eastern Archipelago, with the following western outlier. One species, *Mangifera indica*, the Mango, is widely cultivated in tropical countries for the sake of its excellent fruit.

M. gabonensis, A. Lecomte, is an *Irvingia* (*Simarubeæ*).

Calyx 5-partite, with imbricate segments. Leaves oblong-oval or -lanceolate, distinctly petiolate . . . . . *1. *M. indica.*

Calyx shortly 4-lobed. Leaves broadly oblanceolate, attenuated to the base . . . . . 2. *M. africana.*

*1. **M. indica,** *Linn.; DC. Prod.* ii. 63. A glabrous tree. Leaves oblong-oval or oblong-lanceolate, acute or acuminate, usually narrowed into the distinct petiole; ½–1 ft. long, 1–2½ in. broad; petiole 1 in. (½–2 in.). Panicle many flowered, terminal, glabrous or puberulous.

Cultivated; of Indian origin.

2. **M. africana,** *Oliv.* A tree, wholly glabrous, of 30 ft. or more. Leaves very coriaceous, shining, somewhat clustered toward the ends of the branches, rather broadly oblanceolate, much attenuated below to the short petiole or winged base, rounded at the apex with a narrowed acute apiculus; midrib and lateral nerves prominent beneath; 6–14 in. long, 2–3½ in. broad towards the apex. Panicle terminal, erect, exceeding the leaves, 1–1½ ft. long, pyramidal, with spreading or ascending branches. Pedicels articulated at base, equalling or shorter than the campanulate, shortly and obtusely 4-lobed calyx. Petals oblong-spathulate, clawed, not appendaged within. Antheriferous stamen solitary; filament thinly glandular-puberulous; staminodia minute, rudimentary. Female flower not seen.

Upper Guinea. River Muni, W. tropical Africa, *Mann!*

*4. **ANACARDIUM,** Rottb.; Benth. et Hook. f. Gen. Pl. i. 420.

Flowers polygamous. Calyx 5-partite; segments imbricate, deciduous. Petals 5, narrow, imbricate. Stamens 10, few or all antheriferous, unequal. Ovary free, sessile, obovate, with an oblique style; "ovule lateral." Nut reniform, oblique, supported upon a fleshy pear-shaped enlargement of the torus and pedicel. Seed reniform.—Trees or shrubs. Leaves alternate, simple, petiolate, entire, coriaceous. Panicles terminal, bracteate.

A small tropical American genus, the following species of which has become widely spread in hot climates.

*1. **A. occidentale,** *Linn.; DC. Prod.* ii. 62. Leaves obovate or obovate-elliptical, broadly rounded or retuse above, cuneate or slightly rounded to the petiole, glabrous, with prominent midrib and divergent lateral nerves, usually 3–6 in. long, 2–3½ in. broad; petiole ⅛–1 in. long.

I have seen specimens only from Congo and the islands of the Gulf of Guinea. It is cultivated also on the East Coast.

5. **HÆMATOSTAPHIS,** Hook. f.; Benth. et Hook. f. Gen. Pl. i. 422.

Flowers small, dioecious. Male fl. (only known): Calyx unequally 3-fid; lobes obtuse. Petals 3, obovate-oblong, imbricate. Stamens 6, unequal, alternately longer, all fertile. Ovary 0. Fruit an oblong crimson drupe, with a thick 1-celled, 1-seeded, bony endocarp. Seed exalbuminous, pendulous, with curved fleshy cotyledons and a minute radicle.—A small tree. Leaves alternate, unequally pinnate, multifoliolate, collected at the extremities of the branches. Panicle elongate, laxly branching. Flowers shortly pedicellate. Fruit acid, edible.

Based upon the following solitary species, peculiar to W. tropical Africa.

1. **H. Barteri,** *Hook. f. in Trans. Linn. Soc.* xxiii. 169. *t.* 25. Leaves narrow, 9–15 in. long. Leaflets alternate or subopposite, petiolulate, oblong, obtuse or emarginate, entire, rather glaucous beneath, 1½–2½ in. long, ½–¾ in. broad; petiolules 1–1½ lines. Panicles 1½ ft. long or more. Bracteoles minute. Drupe ¾–1 in. long.

Upper Guinea. Nupe, Niger, *Barter!*

Mr. Barter calls the fruit the "Blood-plum" of the Nupe district.

6. TRICHOSCYPHA, Hook. f.; Benth. et Hook. f. Gen. Pl. i. 423.

Flowers small, unisexual or hermaphrodite. Calyx 4(–5)-fid; lobes ovate or deltoid. Petals 4(–5), ovate, valvate in æstivation. Male fl.: Stamens as many as and alternate with the petals; filaments filiform, inflexed in bud; anthers elliptical or ovate-oblong, versatile. Ovary 0. Female or hermaphrodite fl.: Stamens shorter; filaments subulate; anthers ovoid (effete?). Ovary sessile, ovoid, surrounded by a more or less distinct disk, densely hirsute; styles usually 3, nearly or quite free, glabrous; stigmas capitellate. Ovule solitary, pendulous. Fruit (in one species) ovoid, dry and indehiscent, bearing the remains of the styles. Seed exalbuminous, with a thin testa. Cotyledons thick, plano-convex.—Small trees or scandent shrubs. Leaves ample, alternate, unequally pinnate, 9–15-foliolate; leaflets entire, membranous or coriaceous. Flowers in short, dense or clustered, terminal panicles.

Confined to W. equatorial Africa.

Leaflets membranous or thinly coriaceous. Male flowers in compact panicles . . . . . 1. *T. Mannii.*

Leaflets coriaceous, shining above. Male flowers sessile, densely clustered in branching panicles . . . . . 2. *T. lucens.*

1. **T. Mannii,** *Hook. f. in Benth. et Hook. f. Gen. Pl.* i. 423. A small tree. Leaves imparipinnate, ample, 2–3 ft. long, 11–13-foliolate, the rachis more or less hirsute- or strigillose-pilose; leaflets approximated in pairs or alternate, oval-oblong or oblanceolate-oblong, usually acuminate, glabrous above excepting the impressed strigillose midrib, sparsely pilose or at length wholly glabrous beneath, with prominent midrib and curved looping lateral nerves; 5–10 in. long, $1\frac{1}{2}$–$3\frac{1}{4}$ in. broad (the lower often smaller); petiolules not exceeding 1 or 2 lines or 0. Flowers 2–3 lines in diam., collected in very dense short panicles at the ends of the branches 2–4 in. long and broad. Pedicels 1–2 lines, of the perfect flower stout, strigillose or glabrous. Calyx 4(–5)-fid; lobes deltoid, acute. Stamens of the male flower with filiform filaments, exserted, of the hermaphrodite shorter than the petals. Ovary densely hirsute; styles free nearly from the base, glabrous. Fruit ovoid, apiculate, tipped with the remains of the styles, about $\frac{1}{2}$ in. long, coriaceous and thinly pilose.

Upper Guinea. Gaboon river and Old Calabar river, *Mann!*

The petals of the male flowers retain a deep-red colour when dry.

2. **T. lucens,** *Oliv.* A climbing shrub, attaining 30 ft. Leaves rather coriaceous, $\frac{3}{4}$–2 ft. or more in length, rachis puberulous or glabrescent; leaflets 11–15, the lateral approximated in pairs, oval-oblong, acuminate, shining above, midrib and lateral nerves prominent beneath, early wholly glabrous or finely puberulous beneath or the impressed midrib above only minutely strigillose, 3–7 in. long, $1\frac{1}{3}$–$2\frac{1}{3}$ in. broad; petiolule 3–6 lines in the male, about 1 line in the female plant in our specimens, Flowers $1\frac{1}{2}$–2 lines in diam., 4-merous (male only seen), sessile, in dense oblong or rounded clusters on

the branches of short, spreading, terminal panicles of 4–6 in. Calyx 4-fid with ovate segments. Petals ovate, obtuse, twice as long as the calyx. Stamens equalling the petals, inserted round a hirsute disk. Young fruits silky with ferruginous hairs, subsessile or on very short, pubescent, stout pedicels.

Upper Guinea. River Muni, W. tropical Africa, *Mann!*

Specimens, with male flowers only, of possibly a third species of *Trichoscypha* are in the Kew herbarium from Fernando Po (Mann). The flowers are sessile or subsessile, glomerulate, in loosely branched panicles as in *T. lucens*, but the leaflets, in texture like those of *T. Mannii*, are only about 5 to each leaf.

7. ODINA, Roxb.; Benth. et Hook. f. Gen. Pl. i. 423.

Flowers polygamous. Calyx 4–5-fid or -partite; segments ovate or roundish. Petals as many, imbricate. Disk small, annular or saucer-shaped. Male fl.: Stamens 8 or 10, inserted under the margin of the disk; anthers versatile or subversatile. Rudiment of ovary usually 4-fid. Fertile fl.: Anthers smaller, often effete (?). Ovary sessile, free, glabrous or hairy, 1-celled. Styles 4 or 3, short, distinct, rather stout; stigmas terminal, Ovule solitary, pendulous. Drupe oblong or ellipsoidal, compressed. "Embryo with flat fleshy cotyledons."—Trees or shrubs. Leaves alternate, deciduous, unequally pinnate, usually collected at the extremities or in lateral tufts from nodes of a previous year; leaflets opposite, entire. Flowers racemose, often fasciculate, shortly pedicellate or subsessile.

A small genus of tropical Africa and Asia. One or two of the following are very nearly allied to Indian species and may prove, with additional material, to be identical. We have fragmentary specimens of apparently undescribed species of *Odina* in the Kew herbarium from various intertropical African localities, but these scarcely deserve to be described. Two distinct species grow at the Cape.

Leaves ½–1½ ft.
- Leafless at time of flowering. Leaflets ovate-lanceolate, glabrescent, subsessile . . . . . 1. *O. Schimperi.*
- Leaves present at time of flowering.
  - Leaves early glabrous.
    - Leaflets subsessile . . . . . 2. *O. fruticosa.*
    - Leaflets distinctly petiolulate . . . . . 3. *O. acida.*
  - Leaves pubescent or tomentose at least beneath.
    - Hairs not stellate. Spikes fascicled on previous wood . . . 4. *O. Barteri.*
    - Tomentum stellate, especially beneath. Spikes 1 or 2, axillary 5. *O. velutina.*

Leaves 1–6 in.
- Leaflets obovate-cuneate. Ovary glabrous . . . . . 6. *O. obovata.*
- Leaflets elliptical. Ovary hirsute . . . . . 7. *O. humilis.*

1. **O. Schimperi,** *Hochst.; Rich. Fl. Abyss.* i. 140. Branches stout, rugose, leafless, apparently, at time of flowering. Leaves ¾–1 ft. with a scattered stellate pubescence at first above, and early deciduous tomentum beneath, 9–11-foliolate; leaflets submembranous, ovate-lanceolate, narrowed to a distinct, obtuse, narrow acumen, obliquely rounded at the base, subsessile or sessile. Racemes simple, clustered at the tomentose extremities of the leafless branches, at length (in ripe fruit) lateral by the elongation of the terminal shoot; racemes of sterile flowers 4–6 in. long, those bearing

chiefly fertile flowers 1½–2 in. long, more or less densely foxy-tomentose; pedicels 1–1½ lines. Petals elliptical, slightly concave. Anthers of the male flowers oblong-elliptical, dorsally affixed, of the female smaller, effete? Drupes glabrous, often retaining the remains of the distinct styles.

Nile Land. Abyssinia, *Schimper! Capt. Pullen!* Sennar, *Cienkowski.*

Nearly allied to *O. Wodier*, Roxb., a common Indian species.

2. **O. fruticosa,** *Hochst.; Rich. Fl. Abyss.* i. 141. Extremities rugged, lenticellate. Leaves present at time of flowering, 9–15-foliolate, at first minutely stellate-pubescent, at length glabrous, ¾–1 ft. long; leaflets obliquely lanceolate, gradually narrowed to a rather obtuse point, base more or less rounded, oblique, sessile or subsessile, 2–3½ in. long, ½–1 in. broad. Flowers usually 4-merous, in simple or once-branched, rather stout, axillary, foxy-tomentose or -pubescent spikes, 1½–3½ in. long, sessile, or pedicels very short and concealed. Calyx-lobes roundish-ovate, imbricate. Petals elliptical, concave, sometimes recurved above. Filaments filiform, inserted in the back of the broadly oblong anthers. Rudiment of the ovary in the sterile flowers 3–4-fid.

Nile Land. Mountains of Abyssinia, *Schimper! Dillon!* Sennar, *Kotschy! Cienkowski!* Madi, *Speke and Grant!*

Affords a resin.

Var.? *parvifolia.* Leaves much smaller. Fruiting-spikes not 1 in. long. Madi, *Speke and Grant!*

Odina fraxinifolia, Fenzl, known to me by name only and not described to my knowledge; may perhaps be *O. fruticosa.*

3. **O. acida,** *Rich.* (under *Lannea*) *in Fl. Seneg.* i. 154. A small deciduous tree. Leaves exceeding 1 ft., 7–11-foliolate, wholly glabrous or with indications of an early deciduous tomentum; leaflets distinctly petiolulate, oval-lanceolate, gradually narrowed to an obtuse subacuminate apex, base obliquely cuneate, 2–4½ in. long, 1½–1½ in. broad; petiolule 1½–3 lines. Flowers in stellate-tomentose, ascending, spicate racemes 1–2½ in. long, clustered at the ends of the branches; pedicels 1 line. Calyx-lobes ovate, at length deciduous. Petals oblong-oval. Anthers of the fertile flower small, probably effete. Styles 4, distinct.—(*? O. Oghigee*, Hook. f. Fl. Nigrit. 286. *Spondias Oghigee*, Don, Gen. Syst. ii. 79.)

Upper Guinea. Senegambia; ? Nupe, Niger, *Barter!*

Barter's plant accords well with Richard's description excepting that the leaves are rather larger.

4. **O. Barteri,** *Oliv.* A small tree. Leaves ¾–1½ ft., 7–11-foliolate, very shortly and softly hispid-pubescent throughout, the upper surface at length minutely granular-scabrid from the tubercled hair-bases; lateral leaflets opposite, ovate-elliptical or elliptical, cuspidate or shortly acuminate, more or less broadly rounded at the base, subsessile; hairs simple (not stellate), very short and uniform above, most conspicuous on the veins beneath, 3½–6 in. long, 1½–3 in. broad. Flower-spikes simple, fascicled, from nodes of a previous year, divaricate, 3–5 in. long, pubescent or tomentose. Flowers (male) sessile or very shortly pedicellate, 4-merous. Calyx-lobes ovate, ob-

tuse. Petals obovate. Rudiment of ovary 4-fid. Fertile flowers and fruit not seen.

Upper Guinea. Nupe, Niger, *Barter!*

5. **O. velutina,** *Rich.* (under *Lannea*) *in Fl. Seneg.* i. 154. *t.* 42. Extremities and leaves at first covered with a short, foxy, stellate tomentum. Leaves 5–9-foliolate; lateral leaflets opposite, ovate-lanceolate, obtuse, sessile or subsessile, the upper surface minutely scabrid-tubercled and with scattered stellate hairs, the lower paler, covered with a short tufted or stellate tomentum, 1½–2 in. long, ¾–1 in. broad (probably frequently larger). Flowers in ascending, solitary, simple, axillary racemes or from the nodes of the previous year, 4–6 in. long; pedicels (of male flowers) fascicled, hairy, 1–2 lines long. Calyx-lobes ovate. "Fruit drupaceous, coriaceous, oblong, pubescent, crowned by the short recurved styles."

Upper Guinea. Senegambia, *Perrottet!*

6. **O. obovata,** *Hook. f. in Herb. Kew.* Branches stout, divaricate, the young extremities hoary-tomentose. Leaves clustered at the ends of the branches, 7–13-foliolate, small and narrow, 2–3 in. long, ¾–1 in. wide, more or less hoary with a whitish stellate tomentum, at length probably glabrous; lateral leaflets opposite, coriaceous, obovate, very obtuse, entire, ½–⅔ in. long, ⅓–¼ in. broad. Flowers very small, shortly pedicellate, in ascending, narrow, hoary, axillary racemes, shorter than or nearly equalling the leaves; pedicels stellate-tomentose, not exceeding 1–1½ lines. Calyx small, deeply 4-fid, nearly glabrous. Petals oblong, obtuse, somewhat concave. Anthers of the fertile flowers small, probably effete. Ovary glabrous. Styles 4, distinct. Male flowers and fruit not examined.

Nile Land. Somali country, *Col. Playfair!*
Said to afford a resin collected by the natives.

7. **O. humilis,** *Oliv.* A low, much-branched tree. Branches terete, rather stout, with lateral and terminal tufts of tomentose leaves and flower-spikes. Leaves (partially unfolded in our specimens) under 2 in. in length, 9–11-foliolate, densely whitish-tomentose beneath, scabrid-pubescent with scattered stellate hairs above; leaflets elliptical or ovate, obtuse, not exceeding ⅓–½ in. in length. Flower-spikes ½–1½ in. long, densely tomentose; pedicels very short. Calyx-teeth shortly and broadly ovate. Petals oval, obtuse, veined. Ovary densely hairy.

North Central. Bornu, *E. Vogel!*
Nile Land. Sennar, *Kotschy!*

8. **SPONDIAS,** Linn.; Benth. et Hook. f. Gen. Pl. i. 426.

Flowers small, polygamous. Calyx minute, 4–5-lobed. Petals as many, spreading or recurved, valvate or imbricate in æstivation. Stamens 8–10, inserted under the plicate or crenate disk. Ovary free, sessile, 4–5-celled. Styles 4–5, short, distinct. Ovules solitary, pendulous. Fruit a fleshy drupe with a bony, 1–5-celled, 1–5-seeded putamen. Embryo straight with plano-

convex cotyledons.—Trees. Leaves alternate, often somewhat crowded at the extremities, unequally pinnate; leaflets opposite or subopposite, entire. Flowers in terminal spreading panicles.

A small tropical genus of which two or three species are cultivated for the sake of their fruit (the Hog Plum).

Flowers 2–3 lines diam. Petals valvate . . . . . *1. *S. lutea.*
Flowers 1 line diam. Petals imbricate . . . . . 2. *S. microcarpa.*

*1. **S. lutea,** *Linn.; DC. Prod.* ii. 75. A large tree, wholly glabrous or the leaves puberulous on rachis and nervation. Leaves ¾–1½ ft., 7–9–19-foliolate, membranous or subcoriaceous, wholly glabrous or the rachis and nervation puberulous; leaflets opposite or subopposite, obliquely ovate-lanceolate or -oblong, obtusely pointed or acuminate, rounded at the base on the upper margin, often obscurely undulate-crenate, more or less distinctly reticulate beneath with a marginal vein, petiolulate, 2–3½ in. long, 1–1½ in. broad; petiolules 1–3 lines. Flowers small, in terminal, spreading, rather lax, many-flowered panicles equalling or exceeding the leaves; pedicels 1–3 lines, glabrous or puberulous. Calyx minute, 5-toothed. Petals oval, at length widely spreading or recurved, valvate in bud. Filaments filiform, inserted round a conspicuous plicate or lobed disk. Ovary glabrous, 5-celled. Drupe nearly as large as a plum, yellow or orange.—*S. aurantiaca,* Schum. et Thonn. Guin. Pl. 225 (ex descr.). *S.? dubia,* Rich. in Fl. Seneg. i. 153.

Upper Guinea. Senegal, *Sieber!* near Sierra Leone, *Dr. Kirk!* Niger, *Barter!* Grand Bassa, *T. Vogel!* Ambas Bay, *Mann!* Annabon, *Burton!*

Indigenous in the W. Indies and tropical America. The fruit is eaten.

2. **S. microcarpa,** *Rich. in Fl. Seneg.* i. 151. *t.* 40. A glabrous tree. Leaves 5–13-foliolate, 9–18 in. long; leaflets rather coriaceous, alternate or subopposite, ovate-oblong or the terminal elliptical, lateral very oblique, acuminate, upper margin at the base rounded, glabrous, reticulate, entire, distinctly petiolulate, 3–6 in. long, 1½–3 in. broad; petiolules ¼–½ in. Male flowers 4–5-merous, very small, about 1 line in diam., whitish, usually subsessile, in laxly branching panicles of ½–1 ft. or more from the axils of the upper leaves. Calyx-lobes ovate. Petals distinctly imbricate. Stamens 8 or 10, around a crenate disk. Rudiment of ovary 4-fid. Drupe fleshy, ovoid, the size of a grape, yellow, with a 1–4-celled putamen.—(? *S. Zanzee,* Don, Gen. Syst. ii. 79.)

Upper Guinea. Senegal, *Perrottet!*

This plant having been referred to *Tapiria* by M. Planchon in the Kew herbarium, this genus is stated to be African in the 'Genera Plantarum' of Messrs. Bentham and Hooker, but in a few young fruits attached to the Kew specimens the ovary is certainly not 1-celled and consequently must be referred to *Spondieæ,* although it does not appear to be a good *Spondias.*

S. Oghigee and *S. Zanzee,* Don, Gen. Syst. ii. 79, I cannot quite satisfactorily determine. They are most imperfectly described and the specimens are insufficient or conflicting. *S. Oghigee,* collected at Sierra Leone by Don, in the herbarium of the British Museum, is evidently an *Odina,* as determined by Dr. Hooker (Fl. Nigrit. 286). I have quoted it as a doubtful synonym of *O. acida.* Of *S. Zanzee* there is in the same collection a single

leaf which may or may not belong to the same species as a plant in the Kew herbarium, marked "Spondias Zanzee, G. Don!" by M. Planchon, which I take to be *S. microcarpa*; Rich. Don, however, states that his *S. Zanzee* has a small *black* fruit.

9. **SCLEROCARYA,** Hochst.; Benth. et Hook. f. Gen. Pl. i. 427.

Flowers dicœcious or polygamous. Sepals 4 (rarely 5), roundish, imbricating, coloured. Petals as many, rotundate or obovate, spreading or reflexed, imbricate in æstivation. Male fl.: Stamens 12–24, inserted round a small fleshy disk. Female fl.: (I have not examined). Ovary subglobose, 2–3-celled. Styles short, thick, distinct, with peltate stigmas; (ovules, according to Dr. Kirk, 2 in each cell, pendulous). Drupe with a 2–3-celled putamen, 1 seed in each cell. Seeds exalbuminous. Cotyledons fleshy, oily, radicle superior.—Trees. Leaves alternate, unequally pinnate, clustered at the ends of the branches, glabrous; leaflets opposite or subopposite. Male flowers in spicate racemes.

A small genus confined to Africa and the Mascarene Islands.

Leaves 7–11-foliolate; petiolules usually ¼–1 in. . . . . 1. *S. Caffra.*
Leaves 9–23-foliolate; petiolules 0–2 lines . . . . . 2. *S. Birrea.*

1. **S. Caffra,** *Sond. in Linnæa*, xxiii. 26. A glabrous tree. Leaves rather coriaceous, clustered toward the ends of the branches, 7–11-foliolate, 6–15 in. long; leaflets usually on long petiolules, oblong- or ovate-elliptical, acuminate or apiculate, base oblique, the upper margin at least rounded, entire or obscurely crenulate, 1½–4 in. long, ¾–1½ in. broad; petiolules ¼–1 in., rarely shorter. Flowers in spicate racemes, about ¼ in. in diam.; male racemes 2½–5 in. long; pedicels 1–1½ lines. Petals recurved. Ovules 2 in each cell according to Dr. Kirk, suspended by a thick, fleshy, 'jointed' funicle. Drupe 1½–2 in. diam., roundish, the pulp acid and resinous, putamen thick and bony, 2-celled, with a single seed in each cell; the radicle of the germinating embryo finding exit by a hole at the apex of the cell, from which an operculum or plug falls out. The thick oily cotyledons are edible.

Mozamb. Distr. Lake Nyassa and other localities in Zambesi-land, *Dr. Kirk!*

Native name 'Morula,' according to Dr. Kirk, whose detailed drawings of the ovule and curious fruit are in the Kew herbarium. Our specimens of the true *S. Caffra*, from Natal and Macalisberg mountains, are not very good, and the Zambesi plant may prove distinct. The Macalisberg plant, indeed, may be different from the Natal one; the leaves in the former being nearly white beneath, while in the Natal and Zambesi *Sclerocarya* they are but slightly paler.

2. **S. Birrea,** *Hochst.; Walp. Rep.* v. 418. Leaves tufted at the ends of the branches, 9–23-foliolate, narrow, ½–1 ft. long, wholly glabrous or subglaucous; leaflets opposite or subopposite, oblong- ovate- or obovate-elliptical, obtuse or acute, usually mucronate, base more or less rounded, entire, or of barren branches occasionally toothed, subcoriaceous, slightly paler beneath, ¾–2 in. long, ⅓–1 in. broad; petiolules not exceeding 2 lines in our specimens, or leaflets subsessile. Male flowers in short spikes or spicate racemes with very short pedicels. Drupes borne singly on stout peduncles under 1 in. in length, globose, glabrous, "the size of a walnut."

The seed is edible, and from the pulp a fermented liquor is prepared.—*Spondias Birrea*, Rich. in Fl. Seneg. i. 152. t. 41.

Upper Guinea. Senegambia, *Heudelot!*
Nile Land. Abyssinia, *Schimper!* and others; Madi, *Speke and Grant!* Sennar, *Cienkowski.*

10. HITZERIA, Klotzsch; Benth. et Hook. f. Gen. Pl. i. 427.

Flowers monœcious. Calyx 4(–5)-lobed; segments oval, valvate, and exceeding the petals in bud. Petals 4(–5), inserted on the calyx, slightly imbricate. Stamens (of male flowers) 8, alternately shorter, inserted on the calyx; anthers oval-oblong, mucronate, versatile. Ovary 0. Female flowers (not seen by me) 5-merous. Stamens 10, rudimentary. Ovary 3-celled. Style short; stigma peltate, 3-lobulate. Drupe tomentose, 1-celled, 1-seeded. Seed ascending with a minute inferior radicle and thick, fleshy, plano-convex cotyledons.—Tree. Leaves clustered at the extremities, unequally pinnate, 5–7-foliolate, scabrid-pubescent. Flowers small, in spicate racemes, buds oblong. Drupes eatable.

Based upon the following species.

1. **H. edulis,** *Klotzsch in Peters' Mossamb. Bot.* 89. Leaflets oval- or ovate-oblong, acute or obtuse, rounded at the base, the lateral opposite, subsessile, shortly hispid or scabrid-pubescent at least when young, not exceeding 2½ in. in our specimens.

Mozamb. Distr. Mozambique, *Dr. Peters!* (? Tette, Zambesi, *Kirk*, ♀ but leafless and fragmentary.)

11. LANNEOMA, Delile; Benth. et Hook. f. Gen. Pl. i. 428.

Flowers monœcious. Calyx 4-partite, tomentose. Petals as many, imbricate. Stamens 8; filaments confluent into a minute annular disk at base. Ovary in male flower rudimentary, in female ovoid, 2-celled; stigmas sessile, remote; ovules pendulous. Drupe obovoid with a 2-celled putamen.—A small scabrid-tomentose or pubescent tree. Leaves 3-foliolate, tufted at the nodes. Flowers glomerulate.

Based upon the following and only species.

1. **L. velutina,** *Delile in Ann. Sc. Nat. Sér.* ii. 20. 91. *t.* 1. *f.* 2. Leaflets obovate, median larger, obtuse, entire, scabrid-pubescent, with scattered stellate hairs or the surface minutely tubercled above, stellate-tomentose beneath.

Nile Land. Abyssinia, *Galinier, Schimper!*

I have not had the opportunity of examining flowers or fruit.

Order XLVI. CONNARACEÆ (by Mr. J. G. Baker).

Flowers usually hermaphrodite, regular or nearly so. Calyx quinquepartite, persistent, valvate or imbricated. Petals 5, ligulate and longer than the calyx or rotundate-cuneate and shorter, usually imbricated, free or slightly coherent. Stamens perigynous or hypogynous, 5 or more usually 10, the alternate ones in that case (those opposite the petals) considerably shorter than the others and frequently imperfect; filaments filiform, often monadelphous at the base; anthers short, didymous, the dehiscence introrse, sometimes turned round at length. Disk 0 or thin, surrounded by the base of the stamens. Carpels usually 5, rarely 1–3, free, hairy, 1-celled. Style subulate or filiform; stigma subcapitate, simple or 2-lobed. Ovules 2, collateral, ascending from the base of the inner angle of the cell, orthotropous. Capsule usually solitary, sessile or stipitate, follicular, dehiscing usually in front, rarely on the back, 1- or very rarely 2-seeded. Seeds erect, with or without an arillus or with the testa arilliform below the middle. Embryo either exalbuminous with amygdaloid cotyledons or albuminous with foliaceous cotyledons, the radicle superior or very rarely ventral.—Trees or climbing or erect shrubs. Leaves persistent or deciduous, alternate, exstipulate, simple or imparipinnate, with 1 or many pairs of leaflets; leaflets subcoriaceous or coriaceous, always entire. Flowers small and inconspicuous, racemose or paniculate. Capsule glabrous or naked internally.

A small Order (about 140 species, *fide* Bentham and Hooker), universally dispersed through the tropics and scarcely passing beyond them.

Tribe 1. **Connareæ.**—*Sepals imbricated in æstivation. Seeds exalbuminous.*

Calyx spreading or reflexed.
- Leaves pinnate . . . . . 1. Byrsocarpus.
- Leaves 3-foliolate . . . . . 2. Agelæa.

Calyx clasping the fruit or its stalk.
- Capsule sessile, the fruit-calyx dilated . . . . . 3. Rourea.
- Capsule stalked, the fruit-calyx not dilated . . . . . 4. Connarus.

Tribe 2. **Cnestideæ.**—*Sepals valvate in æstivation. Seeds albuminous.*
- Capsule stalked, glabrous within . . . . . 5. Manotes.
- Capsule sessile, hairy within . . . . . 6. Cnestis.

1. BYRSOCARPUS, Schum. et Thonn.; Benth. et Hook. f. Gen. Pl. i. 431.

Calyx quinquepartite, persistent, the divisions roundish, rigid, much imbricated. Petals 5, linear, exceeding the calyx. Stamens 10, subequal or alternately longer and shorter, the filaments subulate, dilated at the base. Carpels 5, hairy. Style short; stigma terminal, 2-fid. Capsule obliquely oblong, coriaceous, dehiscing by the dorsal suture. Seed sessile, erect, with a broad hilum, oblong, terete, the testa smooth, red, fleshy and arilliform below the middle. Albumen 0. Cotyledons pitted; plumule villose; radicle very short, superior or ventral.—Shrubs with pinnate leaves.

Confined to tropical Africa.

Leaflets elliptical, bluntly rounded at the apex.
Leaflets in 3–7 pairs. Petals ligulate, not imbricated . . . . . 1. *B. coccineus.*
Leaflets in 10–12 pairs. Petals obovate, imbricated . . . . . 2. *B. orientalis.*
Leaflets ovate, acute.
Leaflets ¾–⅞ in. long, ½ in. broad . . . . . 3. *B. ovatifolius.*
Leaflets 1¼–1½ in. long, ⅞–1 in. broad . . . . . 4. *B. maximus.*

1. **B. coccineus,** *Schum. et Thonn. Pl. Guin.* 226. A copiously branched shrub 4 or 5 ft. high, with glabrous, terete, dark-coloured, woody branches mottled with copious, pale, raised spots. Petiole ¼ in. long, firm, slightly downy when young, the rachis 2–3 in. long; leaflets in 3–5 pairs, obovate, the lateral ones alternate, on very short petiolules, about 1 in. long by ½ in. broad, the point rounded and emarginate, the lower side cut away slightly towards the base; texture subcoriaceous, both sides glabrous when mature, the lower a little downy when young. Flowers in copious, lax, 3–5-flowered cymes, the peduncle very short, the pedicels very slender, glabrous, often ⅜–½ in. long, with small lanceolate bracts at the base. Calyx at first campanulate, 1 line deep, the lobes reaching two-thirds down, ciliated, orbicular, much imbricated, finally quite patent, ⅛ in. deep and the lobes then scarcely, if at all, imbricated. Corolla white, 3–4 lines long, the petals equal, under 1 line broad. Stamens all equal and equalling the corolla or alternately longer and shorter and the longer ones falling short of the corolla, with intermediate gradations. Carpels densely grey-silky. Pod about ½ in. long, oblong-cylindrical, very slightly stalked, glabrous, brown, coriaceous, a little curved, finely grooved longitudinally.—Planch. in Linnæa, xxiii. 412; Walp. Ann. ii. 294. *B. puniceus,* Schum. et Thonn. and Planch. l. c. *Rourea coccinea,* Hook. f. Fl. Nigrit. 290.

Var. β. (*B. parvifolius,* Planch. l. c.), leaflets in 5–7 pairs, oblong, the upper ones about ¾ in. long by half as broad.

Upper Guinea. Senegambia, *Heudelot!* Sierra Leone, *Afzelius! Barter!* Guinea proper, *Thonning, Brass! T. Vogel! Barter! Mann!*

After examination of a large number of specimens, it is quite clear to us that no dependence can be placed on the length of the filaments as a specific character, and that there is no definite limit between the 3 species published from the W. coast.

2. **B. orientalis,** *Baker.* A small tree with very rugose glabrous branches mottled like those of the preceding. Petiole ¾–1 in. long, firm, glabrous, the rachis 6–8 in. long; leaflets in 10 or 12 nearly opposite pairs and a terminal one, the lateral ones on stalks under 1 line long, oblong, 1–1¼ in. long by about half as broad, the base equally rounded, the point blunt and slightly mucronate; texture subcoriaceous, both sides glabrous. Flowers as in the preceding. Petals (not seen in our specimens), according to Baillon, obovate and much imbricated. Fruit-calyx deeper than in the preceding (2 lines), the lobes subdeltoid. Pod ½–¾ in. long, slightly curved.—*Rourea orientalis,* Baillon, Adans. vii. 230.

Mozamb. Distr. Zambesi-land, Shupanga; Rovuma, *Dr. Kirk!*

Also a plant of Madagascar, from whence M. Baillon (l. c.) has described 2 additional species.

3. **B. ovatifolius,** *Baker.* Branches woody, terete, glabrous, not mottled. Petioles slender, glabrous, ¾–⅞ in. long, the rachis 1½–2 in. long;

leaflets 7–9, ovate, $\frac{3}{4}$–$\frac{7}{8}$ in. long, more than half as broad, acute, the base slightly rounded, the lateral ones subopposite, on petiolules 1 line long; texture subcoriaceous, both sides glabrous; veins beneath not raised. Flowers in lax cymes. Corolla not seen. Fruit-calyx 2 lines deep, the lobes bluntly rounded, scarcely fully patent when mature. Pod sessile, oblong-cylindrical, $\frac{5}{8}$ in. long, $\frac{1}{4}$ in. thick, glabrous, slightly curved.

Mozamb. Distr. Banks of the Rovuma river, thirty miles from the coast, *Dr. Meller!*

4. **B. maximus,** *Baker.* A small tree, with glabrous, rugose, mottled branches. Petioles 1–1$\frac{1}{4}$ in. long, slender, glabrous, the rachis 2–3 in. long; leaflets 7–9, obovate or broad ovate, 1$\frac{1}{4}$–1$\frac{1}{2}$ in. long, $\frac{7}{8}$–1 in. broad, subacute, the base rounded; texture subcoriaceous, both sides quite glabrous, the veins beneath not raised. Flowers in lax cymes. Petals not seen. Fruit-calyx 2 lines deep, the lobes subdeltoid, scarcely spreading fully when mature. Pod sessile, oblong-cylindrical, $\frac{5}{8}$ in. long, $\frac{1}{4}$ in. thick, glabrous, considerably curved.

Mozamb. Distr. Banks of the Rovuma, *Dr. Kirk!*

2. AGELÆA, Soland.; Benth. et Hook. f. Gen. Pl. i. 432.

Calyx quinquepartite, persistent, the divisions ligulate or narrow-ovate, at first slightly imbricate, afterwards spreading or reflexed. Petals 5, lanceolate or ligulate, free or slightly cohering in the lower half. Stamens 5, free, or 10, united or free at the base, the filaments filiform. Carpels 3–5, very hairy, narrowed into the subulate styles; stigmas simple or 2-lobed. Capsules 1–2, velvety, sessile or short-stalked, coriaceous, rugose or lamellate. Seed erect, the testa coriaceous or crustaceous, fleshy and arilliform from the base above the middle; albumen 0.—Trees or erect or climbing shrubs, with 3-foliolate leaves.

A small genus, common to Africa and the Malay Archipelago.

Stamens 5, included . . . . . 1. *A. Lamarckii.*
Stamens 10, exserted.
Petals free to the base. Leaves glabrous beneath. . . . . 2. *A. obliqua.*
Petals cohering below. Leaflets villose beneath . . . . . 3. *A. villosa.*

1. **A. Lamarckii,** *Planch. in Linnæa,* xxiii. 438. A wide-climbing shrub, with woody glabrous or slightly downy branchlets. Petiole 2–3 in. long, firm, usually glabrous. Leaflets 3, the terminal one on a petiole 1 in. long, obovate or rounded, cuspidate, 3–4 in. long, 2–3 in. broad, the base rounded, the lateral ones nearly sessile, unequal-sided; texture coriaceous; upper surface glabrous, lower glabrous or slightly downy, only the principal veins prominent. Flowers in copious thyrsoid panicles, sometimes 1 ft. long, the lower branches erecto-patent, copiously compound. Pedicels very short, the flower scarcely more than $\frac{1}{8}$ in. long, the petals free, equalling the sepals, which are firm in texture and velvety on the back, the expanded flower star-like, 2 lines broad. Stamens 5, free to the base, included. Pod obliquely oblong-turbinate, as in the other species and similar in size, finely velvety. —Baillon in Adans. vii. 238. *Connarus pinnatus,* Lam. Dict. ii. 95; Cav. Diss. vii. 376. t. 223. *Omphalobium pentagynum,* DC. Prod. ii. 86.

Mozamb. Distr. Moramballa hills, alt. 3500 feet, Zambesi-land, *Dr. Kirk!*
A common Mauritian and Madagascar species.

2. **A. obliqua,** *Pal. Beauv. Fl. Oware*, i. 95. *t.* 59 (*Cnestis*). An erect or climbing shrub, with firm, woody, glabrous or slightly downy branchlets. Petioles 2–4 in. long, firm, glabrous. Leaflets 3, the terminal one on a petiolule about 1 in. long, roundish or broad-ovate, with a cuspidate point and rounded base, 4–6 in. long and nearly as broad, the lateral ones nearly sessile, smaller and unequal-sided; texture coriaceous, both sides glabrous, the under one with the main veins prominently raised. Flowers in ample panicles, often 1 ft. long, and more than half as broad, generally just above the leaves, but sometimes the lower part down amongst them, the lower branches copiously compound, erecto-patent or divaricate at a right angle. Bracts minute, lanceolate, deciduous. Ultimate pedicels shorter than the calyx, which is $\frac{1}{8}$ in. deep, the divisions elliptical, free down to the base, finely grey-velvety on the back. Petals free, elliptical, 2 lines long, scarcely over $\frac{1}{2}$ line broad. Stamens 10, united at the base, exserted. Pod 6–7 lines long by half as thick, oblong-turbinate, rugose, finely velvety, considerably curved, not stalked, the calyx reflexed, not dilated.—*A. nitida*, Soland., *fide* Planch., Walp. Ann. ii. 305; Baillon in Adans. vii. 238.

Upper Guinea. Senegambia, *Heudelot!* Sierra Leone, *Afzelius! Irving! Barter! Smeathmann! Mann!* Prince's Island and Fernando Po, *Mann!* Guinea, *Palisot de Beauvois; Brass! Duparquet!*

3. **A. villosa,** *Soland. mss., fide Planch. in Linnæa*, xxiii. 438. A wide-climbing shrub, with terete, woody, densely ferruginous-downy branchlets. Petioles 2–3 in. long, firm, downy. Leaflets 3, the terminal one on a petiolule 1 in. long, obovate-oblong, 4–7 in. long, 3–4 in. broad, cuspidate, the lower part much narrowed and the base subcuneate, the lateral ones nearly sessile, smaller and unequal-sided; texture subcoriaceous; upper surface glabrous, lower finely downy, the veins and veinlets prominent. Flowers in ample thyrsoid panicles above the leaves, which are sometimes 1 ft. long and more than half as broad, the lower branches copiously compound, erecto-patent. Bracts linear, downy, the lower ones sometimes $\frac{1}{2}$ in. long. Calyx about 2 lines deep, densely downy, the divisions ovate or ligulate, reaching down to the base. Petals scarcely exceeding the sepals, cohering towards the base. Stamens 10, shortly monadelphous, the longer ones equalling or slightly exceeding the petals. Pod $\frac{1}{2}$ $\frac{5}{8}$ in. long, $\frac{1}{4}$ in. thick, oblong-turbinate, rugose, with longitudinal grooves, densely velvety, considerably curved, narrowed at the base but not truly stalked, the calyx reflexed.—Baillon in Adans. vii. 237. *Cnestis trifolia*, Lam. Dict. iii. 24. *Omphalobium villosum*, DC. Prod. ii. 86; Deless. Ic. Select. iii. t. 58. *O. nervosum*, G. Don, Gard. Dict. ii. 90.

Upper Guinea. Senegambia, *Heudelot!* Sierra Leone, *Afzelius! G. Don! Morson! Smeathmann! Barter!* Prince's Island, *Mann!* Guinea, *Mann! Duparquet!*

Lamarck's is the oldest name, but all the species are 3-foliolate.

3. ROUREA, Aubl.; Benth. et Hook. f. Gen. Pl. i. 432.

Calyx quinquepartite, the divisions larger in fruit and imbricated, clasping the base of the fruit. Petals 5, longer than the calyx, usually linear-oblong. Stamens 10, alternately longer and shorter, the filiform filaments united at the base, the anthers didymous. Carpels 5, four usually imperfect, the fifth attenuated into a straight subulate style, the stigma subcapitate. Capsule sessile, curved, clasped at the base by the calyx, chartaceous, 1-seeded. Seed erect; the arillus erect, incomplete, slit in front, equalling or shorter than the seed; testa shining, smooth; albumen 0.—Trees and shrubs.

A considerable genus, belting the world in the tropics.

Follicle glabrous.
- Flowers in lax 6–12-flowered racemes . . . . . 1. *R. santaloides.*
- Flowers very numerous, in dense panicles . . . . . 2. *R. myriantha.*

Follicle velvety.
- Leaflets 5–7 . . . . . 3. *R. Solanderi.*
- Lower leaflets 3–5; upper leaves simple . . . . . 4. *R. heterophylla.*

1. **R. santaloides,** *Wight and Arn. Prod. Fl. Ind.* 144. Branches glabrous, terete. Petiole 1½–2 in. long, firm, glabrous. Leaflets 3–5, oblong or obovate-cuspidate, 2–4 in. long, more than half as broad, the lateral ones subopposite, on short petiolules; texture coriaceous, both sides glabrous and glossy, with the veins and veinlets in relief. Flowers in fascicled, lax, 6–12-flowered racemes, 1 in. or less long, the pedicels slender, glabrous, 2–3 lines long, spreading from the axis at a right angle, minutely bracteate at the base. Calyx campanulate, 1 line deep, the divisions broad-ovate, imbricated, glabrous on the back, ciliated round the edge. Petals four times as long as the calyx, yellowish, ligulate, with a space between them in the expanded flower. Stamens equal, rather shorter than the petals, much longer than the styles. Follicle solitary, oblong, 7–8 lines long, narrowed upwards, not compressed, glabrous and considerably curved. *R. Afzelii* and *santaloides*, Planch. in Linnæa, xxiii. 418. *Connarus santaloides*, Vahl, Symb. iii. 87; DC. Prod. ii. 85.

Upper Guinea. Sierra Leone, *Afzelius in Herb. Brit. Mus.!*

Our description is taken from the original specimen in the British Museum, and we cannot distinguish the plant from the common Indian one. We have, at Kew, several specimens from the Guinea coast, which may represent closely allied but distinct species, but none of them are complete enough to form a decided opinion upon. One gathered, by Mann, at Fernando Po, has the leaves much less coriaceous, with the veins not raised, the racemes longer, with slender pedicels ¾–1 in. long, spreading at right angles. The other specimens (Barter, Mann, and Thomson) have the leaves varying in texture between those of the forms already described, but the inflorescence cymose rather than racemose, with pedicels varying from ⅛–¾ in. long. The alliance of the *Cnestis pinnata*, of Beauvois (Fl. Owure, i. 98. t. 60), *Manotes Palisoti*, Planch. in Linnæa. xxiii. 438, is evidently, in our view, here.

2. **R. myriantha,** *Baillon in Adans.* viii. 198. Probably a tree; the branches and whole plant glabrous, the bark pale grey, longitudinally striated, the branches angular, probably nodding. Leaves mostly 5-foliolate. Petiole slender, glabrous, the base suddenly thickened and rugose. Leaflets elliptical, the terminal one the largest, 4½ in. long by half as broad, shortly acu-

minate, the base cuneate, entire or sinuated, subcoriaceous, smooth and shining on the upper surface, much paler below, penninerved, the veins not prominent. Flowers closely crowded, the clusters arranged in copiously branched axillary spikes. Calyx-teeth oblong-lanceolate, accrescent and appressed to the carpels. Petals linear, involute, much narrower than the sepals.

Upper Guinea. Gaboon, *Griffon du Bellay.*

3. **R. Solanderi,** *Baker.* Branches woody, glabrous. Petiole above 1 in. long, firm, woody. Leaflets 5–7, the terminal one oblong, 3–3½ in. long, 1½ in. broad, acuminate, the base scarcely rounded, the lateral ones opposite, on short petiolules, the lowest pair considerably shorter; texture coriaceous, both sides glabrous. Flowers in short racemes. Corolla not seen. Fruit-calyx nearly 3 lines deep, clasping tightly the base of the follicle, coriaceous, glabrous, the divisions ovate, slightly imbricated, Follicle solitary, sessile, 7–8 lines long, oblong, narrowed upwards, considerably curved, finely brown-velvety, not compressed.

Upper Guinea. Sierra Leone, *Afzelius!*

In the only specimen we have seen, which is in the British Museum, there is a solitary flower on a woody finely villose pedicel, more than 1 in. long, with the remains of several other flowers sessile upon it.

4. **R. heterophylla,** *Baker.* Branches strong, woody, terete, glabrous. Lower leaves 3–5-foliolate, on firm glabrous petioles, 1½–2 in. long, the upper ones simple. Terminal leaflet oblong, 3–3½ in. long by about half as broad, the base rounded, subcuspidate; texture coriaceous, both sides glabrous, the lateral ones opposite or subopposite on short petiolules. Flowers in sessile or stalked few-flowered cymes, the peduncle when present slightly grey-downy, the pedicels very short, with small bracts at the base. Calyx 2 lines deep, the divisions ovate, bluntish, finely grey-downy. Pod nearly an inch long, obovate, coriaceous, grey-velvety, slightly curved, not compressed, clasped lightly by the glabrous dilated calyx.

Upper Guinea. Sierra Leone, *Afzelius! in Herb. Brit. Mus.*

4. CONNARUS, Linn.; Benth. et Hook. f. Gen. Pl. i. 432.

Calyx quinquepartite, the imbricated divisions not accrescent, clasping the stalk of the capsule. Petals 5, sometimes slightly cohering. Stamens 10, the alternate ones shorter and sometimes abortive, the filiform filaments united at the base, the anthers didymous. Disk 0 or thin, annular, surrounding the outside of the base of the filaments. Carpels 5, four usually small or deficient, the fifth narrowed into a subulate style, the stigma subcapitate. Capsule obliquely oblong or obovate, subcompressed, stipitate, coriaceous, dehiscing by the ventral suture, 1-seeded. Seed erect, with a lobed incomplete arillus adnate to the lateral hilum; testa polished; albumen 0.—Trees or shrubs, often subscandent.

A considerable genus, belting the world in the tropics.

Petals two to four times as long as the calyx.

Leaflets 1–3 . . . . . 1. *C. africanus.*

Leaflets 5–7. Leaves glabrous.
Carpels solitary. Pod not at all compressed, oblong . . . 2. *C. Duparquetianus.*
Carpels 5. Pod obliquely obovate, much compressed . . 3. *C. floribundus.*
Leaves ferruginous beneath.
Pedicels slender, glabrous, exceeding the calyx . . . . . 4. *C. Thomsoni.*
Pedicels stout, densely ferruginous, shorter than the calyx . 5. *C. Smeathmanni.*
Petals equalling the calyx . . . . . 6. *C. pubescens.*
Petals one-third as long as the calyx . . . . . 7. *C. Mannii.*

1. **C. africanus,** *Lam. Dict.* ii. 95. A shrub of 15–20 ft., with woody, terete, glabrous branches. Petiole 2–3 in. long, the upper leaves simple, the lower 3-foliolate; leaflets elliptical or obovate, 4–6 in. long by about half as broad, acuminate, the base rounded, the terminal one on a petiolule about 1 in. long, the lateral ones opposite, short-stalked; texture coriaceous, both sides glabrous, only the main veins raised beneath. Flowers in ample, terminal, thyrsoid panicles, leafy in the lower part. Pedicels ferruginous, 1 line or less long. Calyx $\frac{1}{8}$ in. deep, the teeth oblong, obtuse, rather unequal, at first imbricated. Petals oblong, three times as long as the calyx, close and nearly 1 line broad. Longer stamens equalling the corolla. Legume subcompressed, distinctly stalked, rigid, coriaceous, glabrous, $1\frac{1}{4}$–2 in. long, $\frac{1}{2}$–$\frac{3}{4}$ in. broad, the upper edge curved, the lower nearly straight.—Cav. Diss. vii. 375. t. 221. Planch. in Linnæa, xxiii. 426. *Omphalobium africanum*, DC. Prod. ii. 85; Guill. et Perr. Fl. Seneg. 156.

Upper Guinea. Senegambia, *Perrottet! Bidjem! Heudelot!* Sierra Leone, *Afzelius! Smeathmann! Don!* Guinea, *Barter! Mann!*

2. **C. ? Duparquetianus,** *Baillon in Adans.* vii. 236. A shrub, 12–15 ft. high, with firm, terete, glabrous branches. Petiole 6–8 in. long, glabrous, woody, much thickened at the base. Leaflets 5–7, oblong or obovate-oblong, the terminal one in one of our specimens 1 ft. long by 6 in. broad, cuspidate, the base subcuneate, the lateral ones not opposite, on dilated indurated stalks, $\frac{1}{4}$–$\frac{1}{2}$ in. long; texture coriaceous; upper surface rather glossy, the lower with the veins and veinlets prominently raised, both quite glabrous. Flowers in dense, fascicled, 4–6-flowered racemes under 1 in. long, from the main branches; the peduncles and short pedicels densely ferruginous. Calyx $\frac{1}{8}$ in. deep, ferruginous-velvety, the divisions oblong. Petals two to three times as long as the calyx, the longer stamens equalling them. Style 0. Pod like a small acorn, not compressed, oblong, very slightly oblique, $\frac{5}{8}$ in. long, glabrous, with a short distinct stalk.

Upper Guinea. Old Calabar, *Mann! Duparquet.*

This will doubtless have to form a new genus, but as we do not possess ripe fruit, we leave it here for the present. It has no style and only a single carpel. The fruit is not at all compressed, and very slightly oblique, and, so far as we can judge from our imperfectly matured specimen, may not unlikely be indehiscent. M. Baillon assigns to it two ovules, but we have only been able to see one.

3. **C. floribundus,** *Schum. et Thonn. Pl. Guin.* 299. A woody climber, 10–15 ft. high, the branches terete, ferruginous when young. Petioles 3–4 in. long, firm, glabrous, incrassated at the base. Leaflets 5–7, obovate-oblong, 4–5 in. long, $1\frac{1}{2}$–2 in. broad, cuspidate, the base slightly rounded or subcuneate, the lateral ones opposite or alternate on short petiolules;

texture coriaceous, both sides quite glabrous, the veins hardly at all raised. Flowers in ample terminal panicles, sometimes more than 1 ft. long, the branches erecto-patent, finely ferruginous. Calyx under 1 line deep, the divisions oblong, ferruginous on the back. Petals ligulate, three times as long as the calyx, under ½ line broad. Longer stamens about equalling the calyx. Pod ¾ in. long, nearly as broad, the lower margin nearly straight, the upper obliquely rounded, the faces subcompressed, striated, the ferruginous stipes 2 lines long.—Planch. in Linnæa, xxiii. 425. *Omphalobium Thonningii*, DC. Prod. ii. 86.

Upper Guinea. Fernando Po, *Mann!* Guinea, *Brass! Thonning!*

In Planchon's Monograph in the Linnæa, he both adopts Schumacher and Thonning's *Connarus floribundus*, and gives the same specific name (l. c. p. 435) to a new species from Dutch Guiana. Our plant of course will have to retain it.

4. **C. Thomsoni,** *Baker.* A shrub, with woody, terete, glabrous branches. Petioles slender, glabrous, 2 in. long. Leaflets 5, oblong or slightly obovate, 2–3 in. long by half as broad, cuspidate, the base rounded, the lateral ones opposite, on very short petioles; texture subcoriaceous; upper surface glabrous, lower with fine, short, spreading, greyish pubescence, especially on the slender raised veins. Flowers in a copiously branched terminal subcorymbose panicle. Pedicels slender, glabrous, often two or three times as long as the calyx, which is not more than ½ line deep, the sepals ovate, obtuse, nearly glabrous on the back. Petals ligulate, four times as long as the calyx, the longest stamens falling short of them. Pod not seen.

Upper Guinea. Old Calabar, *Thomson!*

Very like *C. Mannii* in general habit, leaves, and pubescence; different in the petals.

5. **C. Smeathmanni,** *DC. Prod.* ii. 86 (*Omphalobium*). A woody climber, the branches terete, ferruginous when young, glabrous when mature. Petioles 2–3 in. long, incrassated at the base; leaflets 5–7, oblong, with a slight obovate tendency, 4–5 in. long by rather less than half as broad, cuspidate, the base rounded, the lateral ones nearly or quite opposite; texture coriaceous; upper surface glabrous, glossy, lower densely matted when young with ferruginous silky tomentum, glabrous when mature. Flowers in copious terminal panicles, the branches erecto-patent, densely ferruginous. Pedicels stout, very short, densely ferruginous like the calyx, which is more than 1 line deep, the divisions ligulate-oblong. Petals ligulate, nearly ¼ in. long, under ½ line broad. Longer stamens nearly equalling the corolla. "Pod ¾ in. long, three-quarters as broad, obliquely obovate, striated, ferruginous when young."—*C. Griffonianus*, Baillon in Adans. vii. 235.

Upper Guinea. Sierra Leone, *Smeathmann, fide De Candolle;* Gaboon country, *Mann! Griffon du Bellay, fide Baillon.*

Very doubtfully distinct from *C. floribundus*. The rather larger flowers and leaves matted beneath when young are the only difference.

6. **C. pubescens,** *Baker.* A shrub, 15 ft. high; the branches terete, glabrous. Petioles 2–3 in. long; leaflets 5–7, obovate-oblong, 4–5 in. long by just half as broad, cuspidate, the base rounded, the lateral ones opposite, on short petiolules; texture subcoriaceous; upper surface glabrous, lower with

rather spreading fine ferruginous pubescence, the veins fine but prominent. Flowers in terminal subcorymbose panicles. Pedicels slender, finely hairy, equalling or shorter than the campanulate calyx, the divisions of which are ovate-oblong, twice as long as broad, ciliated and finely silky on the back. Petals not more than equalling the calyx, the stamens exserted. Pod not seen.

Upper Guinea. Old Calabar, *Mann!*

7. **C. Mannii,** *Baker.* A woody climber, the young branches finely ferruginous. Petiole 2–3 in. long; leaflets 5–7, oblong or slightly obovate, 4–6 in. long by more than half as broad, cuspidate, the base broadly rounded, sometimes subcordate, the lateral ones opposite, on short petiolules; texture subcoriaceous, upper surface glabrous, lower thinly matted all over with very fine, silky, greyish pubescence, the veins slender but prominent, ferruginous. Flowers in ample terminal panicles with erecto-patent branches clothed with fine, greyish-ferruginous, silky pubescence; pedicels sometimes exceeding the calyx, which is 2 lines deep, densely matted on the back, the divisions ligulate, under ½ line broad. Corolla only a third as long as the calyx, the petals ovate. Stamens equal and all equalling the calyx. Pod not seen. Ovaries 5, hairy.

Upper Guinea. On the river bank, Old Calabar, *Mann!*

5. **MANOTES,** Soland.; Benth. et Hook. f. Gen. Pl. i. 433.

Calyx quinquepartite, persistent, spreading in fruit, the divisions ovate-lanceolate, unequal, valvate. Petals 5, ligulate, exceeding the calyx. Stamens 10, arising from a short pubescent gynophore. Carpels 5, placed on the apex of the gynophore, ovoid, attenuated into filiform styles, the stigma subcapitate. Capsules 1–5, stipitate, velvety, obliquely turbinate, quite naked within. Seed erect; testa subcarnose; albumen copious; embryo oblong; radicle short, superior.—Woody climber.

Restricted to W. tropical Africa.

Corolla 2 lines deep.
- Branches of the panicle slender, divaricated, nearly glabrous . . 1. *M. expansa.*
- Branches of the panicle robust, erecto-patent, densely ferruginous . 2. *M. Griffoniana.*

Corolla 4 lines deep . . . . . 3. *M. longiflora.*

1. **M. expansa,** *Soland. fide Planch. in Linnæa,* xxiii. 439. A woody climber, the branches mottled, like those of *Byrsocarpus,* with copious, raised, grey points, slightly grey-downy when young. Petioles 1 in. long; leaflets 5–7, ovate or oblong, 1½–2 in. long by half as broad, acuminate, the base rounded, the lateral ones opposite, nearly sessile; texture subcoriaceous, under surface slightly ferruginous on the veins when young, glabrous when mature. Flowers in a very lax panicle, the branches spreading at right angles, both branches and the main rachis very slender, slightly grey-downy, the ultimate pedicels 2–3 lines long. Calyx campanulate, 1 line deep, the divisions lanceolate, reddish, nearly glabrous. Corolla twice as long as the calyx, the petals whitish, ligulate. Longer stamens equalling the petals. Carpels 5, velvety.

Pod ¾ in. long, half as thick, turbinate, long-stalked, not compressed.—*Cnestis corniculata*, Benth. Fl. Nigrit. 290. non Lam.

Upper Guinea. Guinea, Grand Bassa, *T. Vogel!* banks of the Bagroo river, *Mann!* Sierra Leone, *Afzelius! Smeathmann! Don.*

2. **M. Griffoniana,** *Baillon in Adans.* vii. 244. A woody climber 12–15 ft. high, the old branches glabrous, mottled as in the preceding, the young ones densely ferruginous. Petioles 1 in. long; leaflets 9–11, oblong, 1½–2 in. long by half as broad, acuminate, the base rounded, the lateral ones opposite, nearly sessile; texture subcoriaceous, the under surface slightly ferruginous. Flowers in broad, ample, terminal panicles, the branches thyrsoid, erecto-patent, both these and the main rachis robust and densely ferruginous; pedicels shorter than the calyx, which is campanulate, under 1 line deep, the divisions ovate-lanceolate, erecto-patent. Corolla and longer stamens three times as long as the calyx, the petals ligulate. Pod (not seen mature) obliquely turbinate, turgid, curved, long-stalked, densely brown-velvety.

Upper Guinea. Gaboon country, *Mann! Duparquet and Griffon du Bellay, fide Baillon.*

Lower Guinea. Congo, *C. Smith!*

For the *M. Palisoti* of Planchon, see *Rourea*, p. 455.

3. **M. longiflora,** *Baker.* A woody climber, 10–15 ft. high, the older branches glabrous, terete, not mottled, the young ones finely grey-pubescent. Petioles 1 in. long; leaflets 9–11, oblong or the upper ones obovate, 2–3 in. long by half as broad, acuminate, the base rounded, the lateral ones sessile, opposite or alternate; texture subcoriaceous, upper surface glabrous, lower thinly clothed with spreading greyish pubescence, the veins slender, slightly ferruginous, not much raised. Flowers in broad ample panicles, the branches thyrsoid, erecto-patent, moderately robust and grey-pubescent; ultimate pedicels slender, pubescent, exceeding the calyx, with a linear bract at the base. Calyx campanulate, 2 lines deep, the sepals lanceolate, nearly glabrous. Petals twice as long as the calyx, ligulate. Carpels 5, hairy, seated on a gynophore ½ line high, which is surrounded by a ring composed of the united bases of the stamens, the longer ones equalling the petals, the filaments slightly dilated downwards. Pod not seen.

Upper Guinea. Niger country, Eppah, *Barter!* banks of the river, Old Calabar, *Mann!*

6. **CNESTIS,** Juss.; Benth. et Hook. f. Gen. Pl. i. 433.

Flowers polygamo-dioecious. Calyx quinquepartite, the divisions valvate, subequal, finally patent. Petals 5, longer or shorter than the calyx, ligulate or subrotundate-cuneate. Stamens 10, subequal, the filaments free or subconnate at the base, the anthers finally recurved and appearing extrorse. Carpels 5, sessile. Styles short; stigmas subcapitate. Capsules 1–2, oblong reniform or cylindrical, curved or undulated, velvety on the outside, with rigid hairs on the inside and sometimes on the outside also. Seed erect, exarillate, or the testa subcarnose downwards; embryo shorter than the fleshy albumen.—Woody shrubs.

A small genus, belonging to tropical Africa and the Malay isles, one species Cape.

Leaflets 4–15 pairs.		
Petals exceeding the calyx.		
Rachis of leaves densely pubescent	1.	*C. grisea.*
Rachis of leaves glabrous	2.	*C. corniculata.*
Petals shorter than the calyx.		
Leaflets in 8–10 pairs	3.	*C. ferruginea.*
Leaflets in 12–15 pairs.		
Leaflets blunt. Calyx 2½–3 lines deep	4	*C. macrantha.*
Leaflets acute. Calyx 1 line deep	5.	*C. oblongifolia.*
Leaflets 1–2 pairs	6.	*C. racemosa.*

1. **C. grisea,** *Baker.* A shrub with terete glabrous branches. Leaves 1 ft. long, the petiole about 2 in., clothed with firm, spreading, grey pubescence; leaflets 6 pairs and a terminal one, oblong, the upper ones 3–4 in. long by just half as broad, cuspidate, the base cordate, the lateral ones quite sessile, not quite opposite; texture subcoriaceous, upper surface glabrous unless on the midrib, lower surface with a few scattered, spreading, firm, grey hairs. Flowers in fascicled racemes from the main branches, scarcely more than 1 in. long before the flowers expand, the latter ovoid, sessile, densely grey-pubescent, close together and subtended each by a linear bract, which equals the flower. Mature flowers with a pedicel shorter than the calyx, which is ⅛ in. deep, the divisions lanceolate and finally revolute. Petals twice as long as the calyx, ligulate. Flowers hermaphrodite; the stamens united at the base, the longer ones falling considerably short of the petals. Carpels 5, sessile, densely grey-pubescent. Pod not seen.

Upper Guinea. Old Calabar, *Thomson!*

Inflorescence like that of the Mauritian *C. glabra* and *polyphylla.* It recedes from the other species in the direction of *Manotes* by its stamens joined below and petals exceeding the calyx.

2. **C. corniculata,** *Lam. Dict.* iii. 23. An erect or climbing shrub with terete, woody, glabrous branches. Fully developed leaves 5–6 in. long, the petiole about 2 in.; leaflets in 4–5 pairs, oblong, 2–2½ in. long by about half as broad, subacute, the base broadly rounded or cordate, the lateral ones sessile, subopposite, the lower pairs ovate; texture coriaceous, both sides quite glabrous. Flowers in fascicled axillary racemes 2–3 in. long, the branches thinly grey-pubescent. Calyx subsessile, with 2–3 small, pubescent, linear bracts at the base 2 lines long, the divisions ligulate, slightly pubescent on the back. Corolla when fully expanded slightly exceeding the calyx (2½ lines deep), the petals also ligulate. Pods 1–5, sessile, oblong-cylindrical, 1¼–1½ in. long, narrowed gradually upwards and curved outwards, densely clothed with spreading, bristly, ferruginous hairs 1 line to ½ in. long.—DC. Prod. ii. 87; Planch. in Linnæa, xxiii. 440. *Spondiodes pruriens,* Smeathmann, and *Agelæa pruriens,* Soland. mss. in Herb. Mus. Brit.

Upper Guinea. Senegambia, *Heudelot;* Sierra Leone, *Smeathmann!* Gaboon country, *Griffon du Bellay, fide Baillon.*
Lower Guinea. Congo, *Smith! Burton!*

3. **C. ferruginea,** *DC. Prod.* ii. 87. A shrub, 8–12 ft. high, the

branches terete, the young ones densely grey- or ferruginous-velvety. Fully developed leaves 1 ft. long, the petioles 2 in.; leaflets in 8–10 pairs and a terminal one, the upper ones oblong or ovate-oblong, 2–2½ in. long by half as broad, bluntish, the base cordate, the lateral ones not quite opposite; texture subcoriaceous, upper surface glabrous, lower coated all over with grey-ferruginous tomentum. Flowers in terminal panicles with long, narrow, racemose, erecto-patent branches; pedicels about equalling the calyx, which is campanulate, under ⅛ in. deep, the divisions lanceolate, densely brown-velvety on the back. Petals whitish, rotundate-cuneate, considerably shorter than the calyx. Carpels 1–5, 1–1½ in. long, ½ in. thick below, considerably curved and narrowed upwards, deeply wrinkled with longitudinal grooves, clothed with bright red velvety tomentum.—Planch. in Linnæa, xxiii. 440.

Upper Guinea. Senegambia, *Heudelot!* Sierra Leone, *Smeathmann! Afzelius! Don, Morson!* Guinea proper, *Barter! Burton! Griffon du Bellay!*

Var. β. (*C. fraterna*, Planch. Walp. Ann. ii. 306). Leaves hardly at all pubescent beneath. Senegambia, *Heudelot!*

4. **C. macrantha,** *Baillon in Adans.* vii. 242. A shrub 8 or 10 ft. high, with strong terete branches, densely clothed with grey or slightly ferruginous, spreading pubescence. Fully developed leaves 6–8 in. long, the petiole very short; leaflets in 12–15 pairs and a terminal one, oblong with the 2 sides subparallel, 1¼–1½ in. long, ½–¾ in. broad, the point and base both bluntly rounded, the latter slightly oblique, the lateral ones close, quite sessile; texture membranous, both sides with thin grey pubescence, that of the upper surface shining. Flowers in ample panicles with elongated, erecto-patent, racemose, densely hairy branches; pedicels equalling the calyx, which is 2½–3 lines deep, the divisions ligulate, densely grey or pale brown-velvety on the outside. Petals not more than a third as long as the sepals, rotundate-cuneate, the apex emarginate. Flowers polygamous. Filaments slightly connate at the base. Carpels 5, densely grey-pubescent, the styles nearly as long as the petals. Pod not seen.

Upper Guinea. Old Calabar, *Mann! Duparquet, fide Baillon.*

5. **C. oblongifolia,** *Baker.* A woody climber 30 ft. long, the branches terete, thinly ferruginous-velvety when young. Fully developed leaves 6–8 in. long, the petioles under 1 in. long; leaflets in 12–15 pairs and a terminal one, oblong, with the 2 sides subparallel, 1½–2 in. long, ½–¾ in. broad, narrowed gradually to a point, the base subcordate, the lateral ones close, nearly sessile and opposite; texture subcoriaceous, upper surface glabrous, lower thinly clothed with grey-ferruginous pubescence. Flowers in ample terminal panicles, the lower branches slightly compound; pedicels equalling the calyx, which is campanulate, 1 line deep, the divisions lanceolate, densely brown-velvety on the back. Petals shorter than the calyx. Pod obliquely oblong, 1½ in. long, transversely rugose, densely clothed with scarlet velvety tomentum.

Upper Guinea. Prince's Island and Camaroons country, *Mann!*

Very like *C. ferruginea* in vestiture, flowers, and fruit, but different in the leaves and sometimes with short fascicled racemes in their axils.

6. **C. racemosa,** *Don, Gard. Dict.* ii. 91. A shrub, 10 ft. high, with woody, glabrous, terete branches. Petioles 1½–2 in. long, firm, glabrous; leaflets 3–5, the terminal one ovate-oblong, 3–3½ in. long, 2 in. broad, acuminate, the base broadly rounded, the lateral ones subopposite, on short petiolules, the lowest pair much shorter; texture coriaceous, both sides glabrous and green, veins and veinlets fine, raised. Inflorescence, in the only specimen we have seen, in a raceme 2–3 in. long, with a slender, finely brown-downy rachis from the end of a branch on one side. Flowers not seen. Pod ⅝ in. long, sessile, obliquely oblong, narrowed below, densely clothed with bright red, velvety tomentum.

Upper Guinea. Sierra Leone, *Afzelius!*

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